

POPULAR SCIENCE

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SPECIAL REPORT:
Facts on
**89 Power
Mowers**



**plus: What's Coming in
Next Year's Cars**



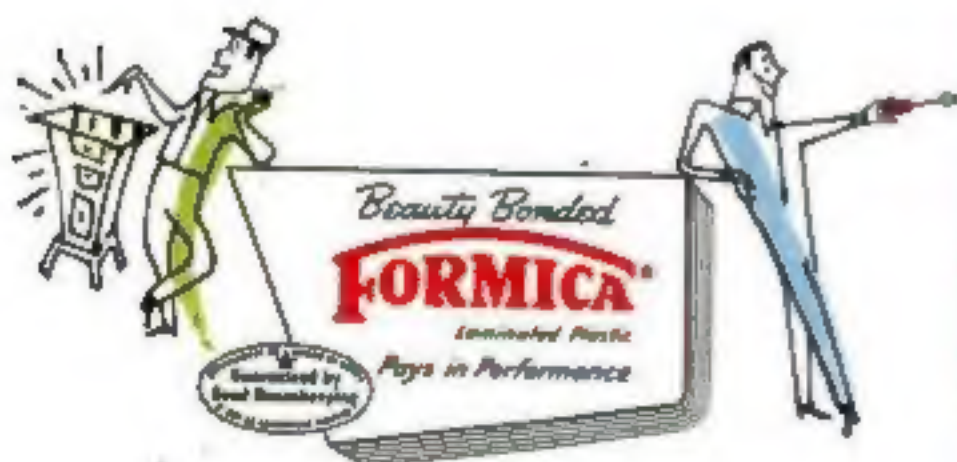
How much of this *Formica Kitchen* remodeling could you do?



Homecraftsmen come in assorted flavors . . . from the weekend bird house mechanic to skilled cabinet makers. Colorful easy-to-work Formica suits the abilities of anybody who can saw a straight line. If you have more enthusiasm than skill you can do simple Formica jobs like resurfacing your present rotted out sink or apply Formica to walls. Even if you tackle tougher jobs like these Formica faced cabinets, you'll find that Formica surfacing is the easiest part of the job . . . and the most fun.

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FREE We have two kits of helpful literature on the use of Formica. Just check the coupon for the one you want.



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This One



9F7Z-QXA-DK12



How we retired in 15 years with \$300 a month

We're having a wonderful time, Betty and I. We're doing all the things we've always dreamed of doing. We enjoy our home. Summers, we pack the car and take trips. And it's all thanks to a check for \$300 that comes by mail, as regular as clockwork, every month!

Luckily for me, I was only forty when Betty began to worry about our future. "You're going to want to slow up in a few years," she'd say. And I'd laugh. Because I felt fine. "But you won't always want to work," she'd say. "Well, I still have fifteen good earning years ahead of me," I'd answer.

But one day she stopped me. She asked me how much I'd earn in the next fifteen years—not counting raises. I did some quick arithmetic, multi-

plying my salary by fifteen. It ran up into six figures! I grinned.

Betty wasn't impressed. "How much of that do you think we'll save?" she asked. I had to be honest. We were always paying off on a new car or a radio, or going places. "A thousand or two," I admitted.

"That's just our trouble," she said. "We can't seem to save. You ought to take out one of those retirement income plans right now."

So I looked into the subject and discovered the Phoenix Mutual Retirement Income Plan. It was a way I could make part of my salary *now* buy me a retirement income *later*. All I needed was to start in time. With a Phoenix Mutual Plan, I could get a check for \$300 a month for life, start-

ing in fifteen years, when I reached fifty-five. I applied immediately and qualified.

The big day came fifteen years later, when our first Phoenix Mutual monthly check for \$300 arrived in the mail. *I retired*. Now Betty and I are having the time of our lives—with no money worries.

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This story is typical. Assuming you qualify at a young enough age, you can plan to have an income of \$100 to \$300 a month or more—starting at age 55, 60, 65 or older. Send the coupon and receive, by mail and without charge, a booklet which tells about Phoenix Mutual Plans. Similar plans are available for women. Don't delay. Send for your copy now.

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Popular Science Monthly

April, 1957



The hard facts about all the leading power mowers—to make it easy for you to choose the one best suited to your needs. . . . ALSO, the latest news on outboards: what to look for, who's got it, and what it costs



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What does a two-by-four really measure? What woods are best for furniture? For shelves? What's the difference between interior and exterior plywood? Here are the facts, in handy booklet form, that help you get the right wood for your job—and save money, too

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PS Readers

TALK BACK

Hi-Fi Scores a Hit

MAY I add my name to your already large list of happily informed hi-fi enthusiasts who agree that the articles published in PS in the past several months . . . have simplified the technical aspects of audio systems.

KEN VOGT, Milwaukee

. . . With the help of the hi-fi articles in



PS, I have chosen a set and hope to enjoy "real music" for a good many years.

G. W. TAPPAY, Vancouver, B. C.

. . . I have been looking for something like the Hi-Fi Test Record described in your January issue ["This Record Checks Out Your Hi-Fi System"] for a long time.

W. C. PIERCE, New Canaan, Conn.

. . . I am ordering your Hi-Fi Test Record even though I realize it may show some unsuspected defects in the homemade rig of which I am so proud.

You are to be commended for the current series on hi-fi components. Very few small towns have any hi-fi displays or stock, and much of this equipment must be bought by mail on a sight-unseen, buyer-beware basis.

L. W. HALSEY, Battle Creek, Mich.

. . . Congratulations on your hi-fi articles. They are the best I have seen, including those in electronics magazines.

CHARLES THAMES, Jackson, Miss.

. . . All of us here at the University of Illinois have been reading the hi-fi articles in the last few issues of POPULAR SCIENCE. We would like to thank you for instructions on what to look for in hi-fi equipment. Most of us enjoy good music, but the cost of schooling absorbs most of our funds. Those of us

who could afford to buy components used your articles as a guide in purchasing the best equipment our money would buy.

Please hurry the test record along before we make costly mistakes in selecting equipment. All 20 of us will be waiting anxiously for the record.

MICHAEL R. SOMIN, Chicago

. . . I especially liked your series on high-fidelity equipment since it is so seldom that such information and specifications are listed together for comparison.

ALVIN L. CHENEY, Donora, Pa.

. . . Thanks for your test record and article ["I Tuned My Speaker with a Test Record," Mar.]. I thought my system was fine—but after checking with your record I found the port needed work.

ROBERT S. THOMSEN, Norwood Park, Ill.

. . . Enclosed is my check for \$52 for 26 of your test records. I showed the article to a couple of hi-fi enthusiasts in the electronics lab where I work, and in no time at all, about two dozen engineers and technicians had asked me to order for them, too.

By ordering all at once we thought you might give us an even better discount than you offered in your article. (Even if you don't it's still a good price!)

EDWARD D. LOOMIS, Lawndale, Calif.

Rather than down, the price of the Hi-Fi Test Record must go up as of April 1.

We developed the record as an editorial service and offered it to readers at a no-profit price of \$2.50. But we didn't expect to get orders for 20,000 records in six weeks!

Because we are not in the record business and are not prepared to produce and sell records, and because our readers have had an opportunity to buy at cost, we are turning the business over to a specialist.

If your dealer cannot supply the Popular Science Hi-Fi Test Record, you can buy it by sending check, cash or money order to Records, 104 E. 26th St., New York 10, N. Y. The price is \$3.50 for one record, \$5 for two.

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D. NEW! Double Head 12-Point 15° Box Wrench. Meets Mil. Spec. Designed for use on elastic stop nuts. Openings, $\frac{3}{16}$ " x $\frac{17}{32}$ ". Length, $5\frac{1}{4}$ ". Satin chrome plated.



AS200

at your magazine for taking credit for certain features on American motorcycles when, in reality, they had been current on British machines in my youth—some 20 years ago.

In all fairness now, this letter is offered as a bouquet. Your January issue, giving as it does, fair and generous publicity to several British advances, is more than welcome.

Actions such as yours can, in my opinion, do more toward creating international harmony than the speeches of dozens of politicians.

NOEL KIRK, Los Angeles

Bomber Delivered PS the Hard Way

A PARTIALLY burned copy of a 13-year-old POPULAR SCIENCE advertisement recently brought a belated inquiry to the Harley-Davidson Motor Co. from Blazon Ernest, a student at the University of Ljubljana in Yugoslavia.

Ernest writes that in 1944, when he was 12 years old, he found a flame-scarred copy



of PS near the wreckage of a U. S. bomber that crashed near his home. Apparently he kept it until he learned enough English to read the contents and answer the Harley-Davidson ad.

JOHN ABOYA, Milwaukee

Strong Words FOR the Safety Car

A BELATED note of appreciation for the article (and preview, I hope) on the Cornell Safety Car [Dec.]. It's about time somebody put some brains into a car—and not splattered on the windshield.

WILLIAM A. CRANE, Oklahoma City

Two Nurses Feel Neglected

THERE was an interesting article on the Santa Fe's new Hi-Level El Capitan in your

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January issue. We were wondering why the two registered nurses who are also a part of the train weren't mentioned.

TWO SANTA FE COURIER NURSES, Chicago

Santa Fe's two pretty courier nurses were both seen and given hi-level praise by Author Wes Griswold. The editorial surgeon who amputated this vital information is blushing. His own daughter is a registered nurse.

Why Break Such a Happy Habit?

FIVE years ago I broke the PS habit and began to make money instead of spending most of my spare time fooling with the fascinating gadgetry suggested in your pages.

However, I did pick up your January issue



to see what you had to say about the B-52. Now I'm involved in four projects and my spare time is gone.

ART BONNEY, Hyde Park, N. Y.

Watch Those Speed Runs

DALE R. NELSON, proud of his '56 Windsor, seems to be stirring up a little competition ["Readers Talk Back," Jan.]. I feel that letters like this may encourage test runs on the highways and not on measured courses.

For the safety of our highways, I feel that uncontrolled contests of this kind should be discouraged.

M. V. OAKES, Grand Junction, Colo.

We agree 100 percent. Mr. Nelson pointed out, however, that his speed run was made "on a blocked-off speed strip."

"Worst" Car Drivers Make the News

AS PRESIDENT of the Rockland High School Safe Driving Club, I can say that the majority of teen-age drivers are most interested in proving that we are not all pirates and ogres behind the wheel ["Who Are America's Worst Drivers?" Jan.]

We younger drivers may have a slightly larger number of accidents per capita as compared with adults, but in newspaper space, we have the adults whipped by a

[Please turn to page 20]

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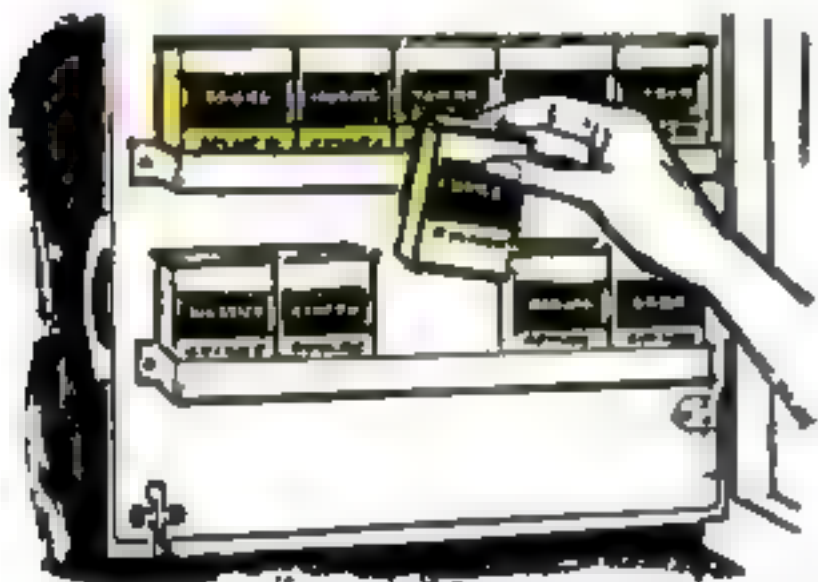
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Keeping the Home Shipshape



METAL WEATHERSTRIPPING needs spring cleaning, too. Tap off loose dust, clean with steel wool and rub with paraffin. Don't paint it or the windows may stick.



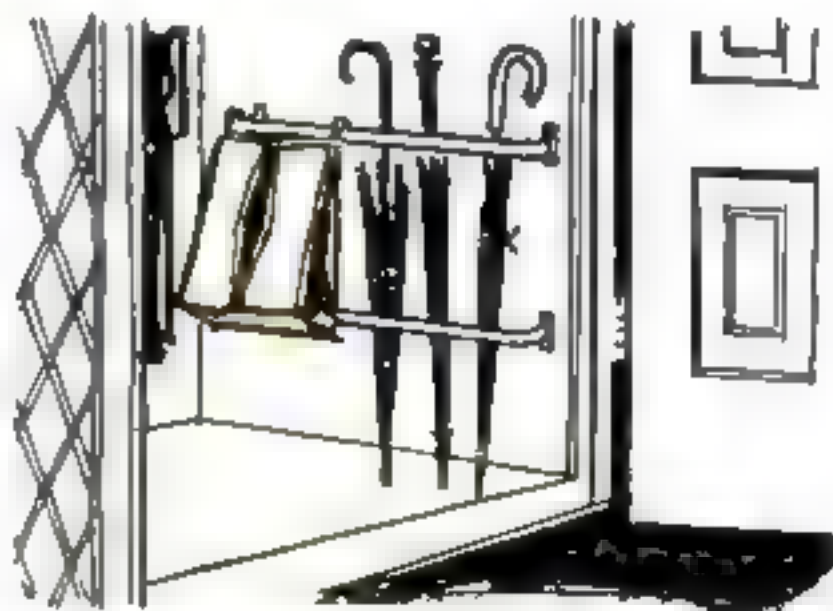
LEFT-OVER COUNTER EDGING can be shaped into a cabinet-door spice rack. Bend the ends of each strip so that cans slide in easily and rest on the lip of the edging.



GIANT WIRE CLIPS like this will mark a garden bed. You can make them by bending lengths of coat hanger wire around a broomstick. Press the coil tight with pliers so that it grips the seed packet firmly.



WHEN PUTTYING WINDOWS, first work paint that matches the sash color into your putty. This will eliminate the need for a touch-up job later with its risk of paint-smearing the glass.



TO STORE UMBRELLAS NEATLY yet keep them handy, corral them in a pair of curtain rods fixed to a wall of a closet near the door. Hang a clothespin bag at one end for rubbers.

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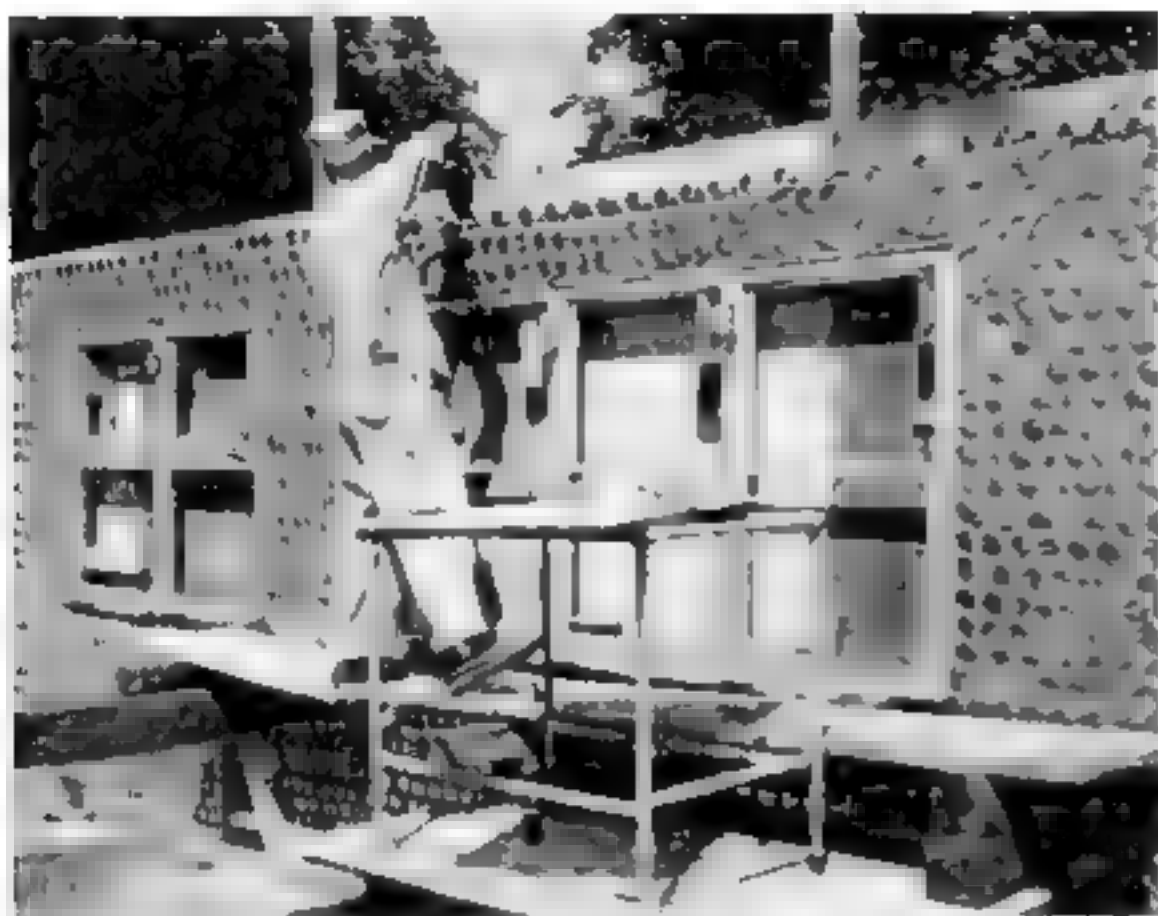
- ☐ Normal P51
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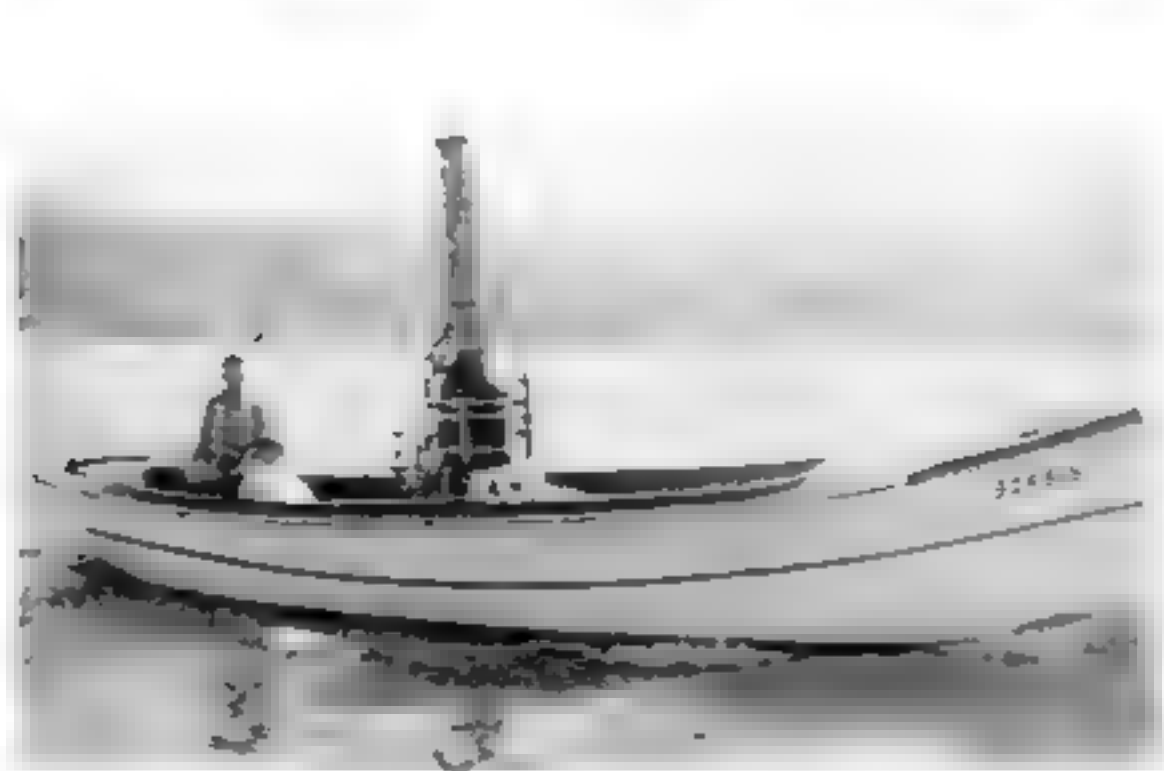
Prize Projects BY PS READERS



Tin-Can House. A Quasqueton, Iowa, family will soon take shelter behind 300,000 empty beer cans. H. J. Hasewinkel, a construction foreman, is building his own house with cans he got from a concessionaire at a local fair. By laying up the cans in mortar reinforced with steel bars, he figures he'll get sturdy walls insulated and soundproofed by the dead air sealed in the cans. He plans to cover the exterior of the house with stucco.



Baby Dozer. A nine-hp. engine runs this garden tractor built by Charles Borte of Silverton, Ore. He put a three-speed transmission and two-speed rear axle in the 1,500-pound vehicle and mounted a 46-inch blade at the front. Individual braking on the rear wheels helps him maneuver in tight spots.



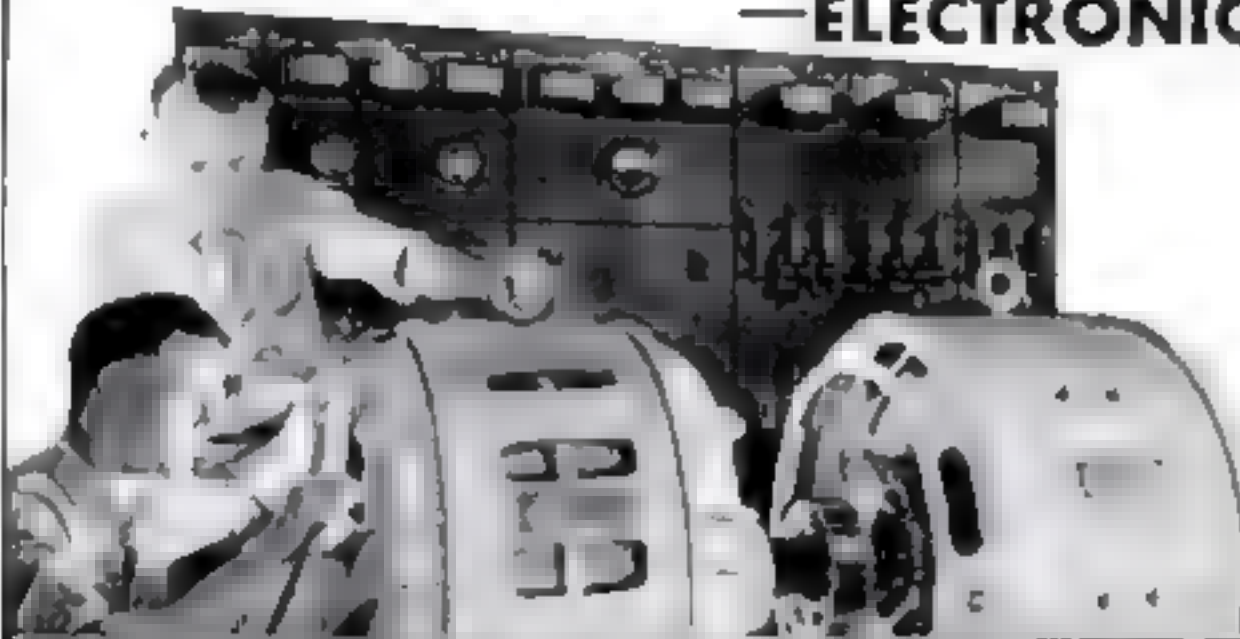
Floating Tea Kettle. Yearning for a steam launch, Gordon Sullivan and Kay Hogan of Seattle learned that a surviving small steamer is hard to find. But they did turn up an old boiler and engine which they mounted on a remodeled hull. Now aboard their 22-foot Quickstep, they whoosh-huff quietly around the noisy boats on Puget Sound.

Have you recently completed a workshop project of which you are particularly proud? Send a good photograph of your work, along with the negative and a brief description,

to POPULAR SCIENCE MONTHLY's Mechanics and Handicraft Editor, 353 Fourth Ave., New York 10, N. Y. We will pay \$15 for each item that is accepted for publication.

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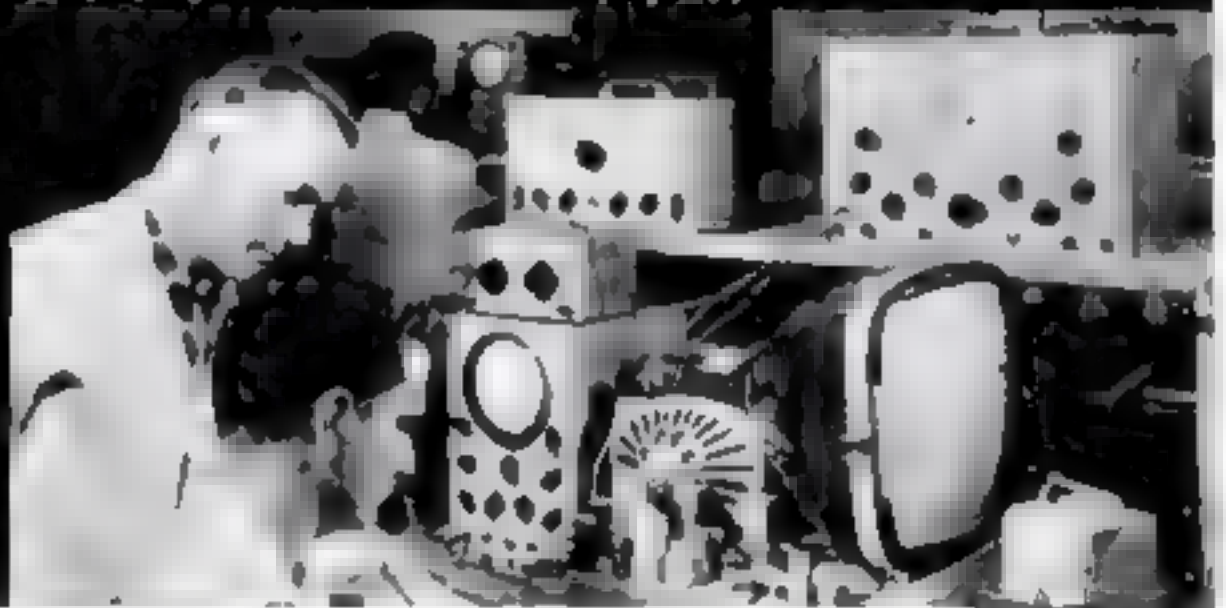
(Shown at left)—Instructor explaining operation of a generator in our A.C. department.

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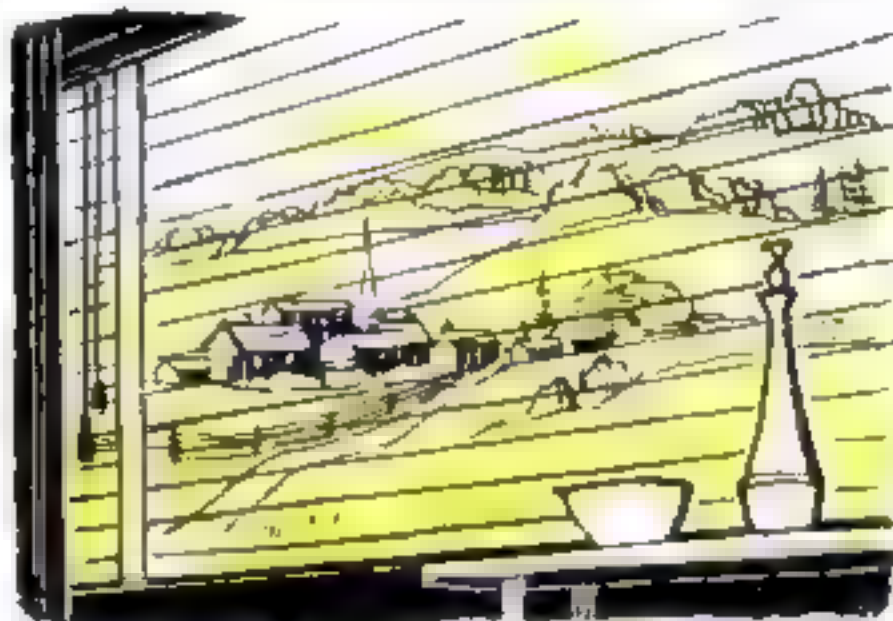
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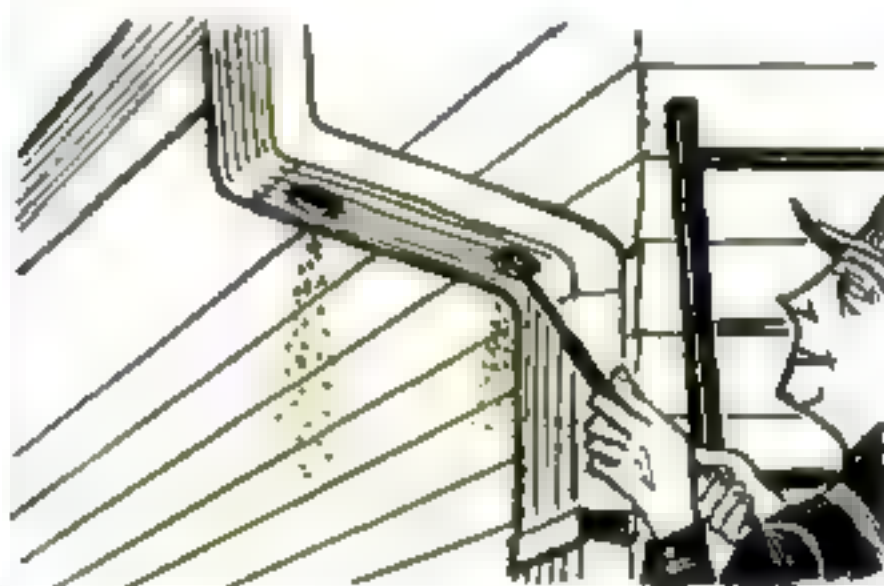
"I'd like to see them make..."



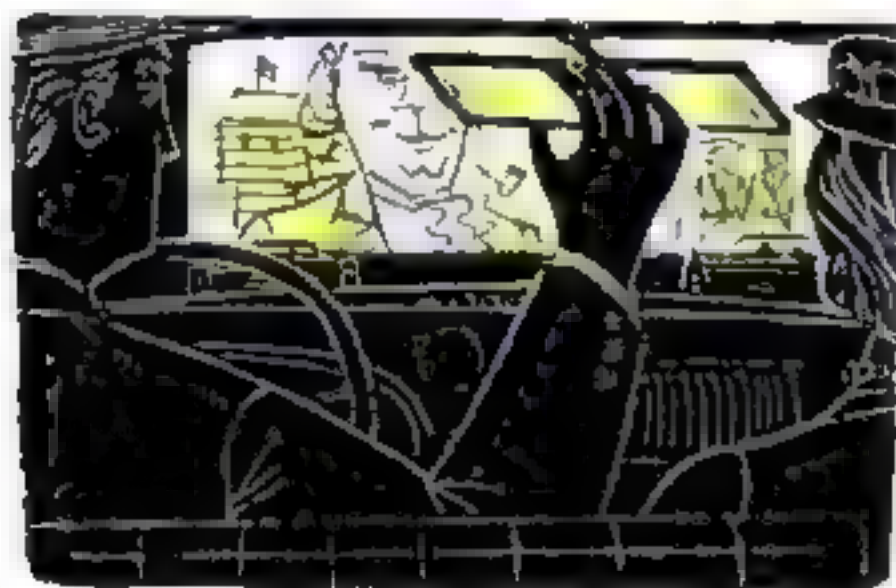
A COMBINATION NAIL AND STAPLE to fasten wire fencing on posts. There'd be less chance of splitting the wood than with two-pronged staples.—*Norman Jupin, New Bedford, Mass.*



SCENIC VENETIAN BLINDS with a landscape painted on the room side of the slats. When the blinds were closed, they would give the effect of a mural.—*R. Hamilton West, Rutherford, N. J.*



CLEANOUTS IN DOWNSPOUTS leading from eaves troughs. Covered access holes every few feet would make it easy to free clogged sections.—*A. R. Tanner Jr., Poughkeepsie, N. Y.*



HINGED REAR-VIEW MIRRORS that you could flip up out of the line of vision, like a sun visor, when you parked the car at a drive-in movie.—*Mrs. Robert C. Guiler, Columbus, Ohio.*



MAGNETIC PAINTBRUSHES that would cling to a paint can when not in use. A magnet set in the handle would hold it snugly to the inner lip of the can.—*B. D. Stewart, Winder, Ga.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What is yours?

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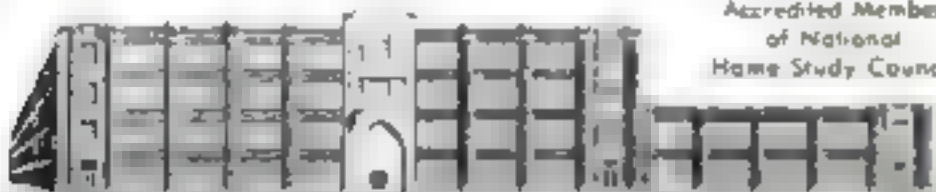
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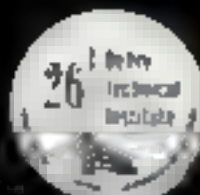


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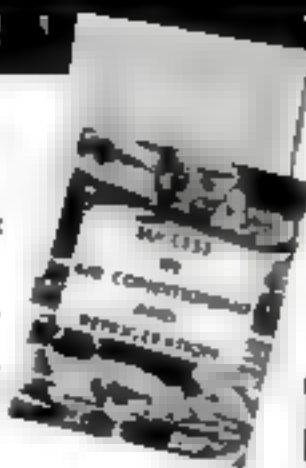
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You ought to know...

Your house saves you money this month—on your income tax. Three out of four Popular Science readers own their own homes. They can include as tax deductions some house expenses that people who live in rented quarters cannot. Be sure you deduct every cent you're entitled to (the Revenue men want you to). Here are the important expenses to check:

1. Real-estate and school taxes are deductible if they were imposed on you and you paid them (even if you borrowed the money to do so). But assessments for improvements in your neighborhood, such as sewers or curbing, are not deductible.

2. Interest on your mortgage is another big item. Don't deduct the total of your monthly payments to the bank, though. These payments ordinarily include something for amortization to pay off the principal. That part of your payments is not deductible. Find out just how much you paid for interest alone.

3. Casualty losses—disaster-caused damages to your house or possessions—are deductible if they were not covered by insurance.

It's not so easy to prove casualty losses—and you will need

proof. Check the local newspaper, which usually reports fires, storms and floods. Your police and fire departments also keep records of such happenings. But you still have to prove that your own property was affected. If the newspaper mentioned you or your neighborhood, you're

Income-Tax Check List for Homeowners

Ice storm? Fire? Damage from these and many other causes may be deducted from your income tax. A quick look over the list below may save you money.

Cause	Property Damaged
FIRE	CAR
WINDSTORM	HOUSE
HEAVY RAINS	CLOTHING
UNUSUAL DROUGHT	FURNITURE
TERMITES	TREES
SUDDEN COLD SPELL	PLANTS AND SHRUBS
SLEET	

in luck. Before-and-after snapshots of your property help.

How much can you claim? The Government allows you the difference between the market value of your entire property before the damage and its value afterwards—provided that is no more than the original cost of whatever was damaged. "Market value" means just that: not what you think your property is worth, but what an expert appraiser (real-estate man, architect or engineer) says—in writing—it can be sold for. Bills (or estimates) for repairs may also be accepted as proof of the amount.

Be sure to claim now any loss during 1956; a later claim is unlikely to be allowed. You don't have to repair or clean up the damage to get your deduction.

A supersonic airliner is in the works in Britain. The British, who pioneered commercial jets, too, have involved seven of their biggest aircraft manufacturers in the research project, which they expect

You ought to know...

to finish in 10 years. If the result is a Mach-1.8 plane (over 1,000 m.p.h.), it could make the London-New York hop in about three hours. Each plane could complete two round trips every 24 hours—a very profitable operation.

Nearly half of all cars stay out in the open all night. The figures shown in the chart below apply to cars belonging to people who own



their own homes; among other people, the percentage of outdoor parking is even higher—76 percent for some apartment dwellers. It makes a difference, too, whether the car involved was bought new or sec-

ond hand; 59 percent of the latter are left out all night . . . It'll be orange juice—650,000 gallons or 13,865,000 glasses—in the hold of a newly converted tank ship plying between Florida and New York. The juice is squeezed (but not frozen) in Florida, packaged in cardboard containers in New York and distributed by milkmen.

Everybody won at the Daytona stock-car races as usual, but the hot-car buffs had some prejudices shaken. The big surprise was Pontiac, which ran wild in its class, taking first and second places in both the flying mile (132 m.p.h.) and the one-mile acceleration run (85 m.p.h.). Among smaller cars it was Chevrolet. Fuel-injection Chevis took the first 33 places in the flying mile, the first 18 places in acceleration . . . There's good reading—amusing and informative—in new books by authors well known to PS readers. Kenneth M. Swezey provides a whole new collection of his delightful home experiments in *Chemistry Magic* (\$4.50, McGraw-Hill, New York), and Senior Editor Martin Mann shows, with simple text and striking photos, how the atom helps your everyday life in *Peacetime Uses of Atomic Energy* (\$4.50, Thomas Y. Crowell Co., New York).

Look for more tries at transatlantic televiewing. The reason: sunspot activity, which is now near its peak (it varies through an 11-year cycle). The sunspots change the character of electrical layers in the atmosphere, and at peak activity may permit signals in the television range to be picked up across the ocean. Both British and American TV organizations are monitoring each other's telecasts in the hope of being able to rebroadcast them. We stand a better chance of picking up something, because the British TV frequency is lower than ours and should get through more easily. (Don't try to get London on your home set, though; British TV, besides using some frequencies lower than the lowest your set can pick up, operates on a different system.)

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mile. When a teen-ager is involved in an accident, all teen-agers are to blame, and we pay dearly in insurance premiums. When an adult is in an accident, the auto "went out of control."

GEORGE HIGGINS, Rockland, Mass.

Forty-Year Reader Speaks Up

SINCE I started reading POPULAR SCIENCE in the Newton (Mass.) free library almost 40 years ago I have not missed many issues. I think the January issue is the best



one yet in subject matter, and most of all in its fresh and inviting visual appearance.

PERRY GITHENS, Westport, Conn.

It's the Martin Matador

IN Frank Harvey's story about the TM-61 Matador [Feb.], he did not mention the missile's builder—the Glenn L. Martin Co. of Baltimore. As a former employee of the company I am displeased and insulted, for it is a great credit to its manufacturer.

KENNETH A. ROZETT, Brooklyn, N. Y.

No insult intended. Everyone connected with the Martin Co. has a right to be proud of the Matador. While we are at it: In the article on the B-52 Air Force A-bomber [Jan.], we failed to mention that the Superfortress is manufactured by the Boeing Airplane Co., of Seattle.

Figures Don't Jibe

IN your February issue you give the inside height of the Buick station wagon as 45.4 inches, while the door-opening height is only 27.6. Also you give the Oldsmobile tailgate opening as 35.6 but the inside height as 30.5. I would appreciate the true figures.

DAVID RICE, Sparta, Wis.

Shame on us! The interior height of the Buick is 30.5 inches and the figure for the Olds tailgate should be 27 6.

Here's Mud in Your Ice

IF YOUR car's rear wheels spin on ice or snow, get out and hit the rear fenders with your fist or a stick. You'll be surprised how much dirt falls from under the fenders on the rear tires and the ground to give you traction.

LAWRENCE W. TORELL, Minneapolis

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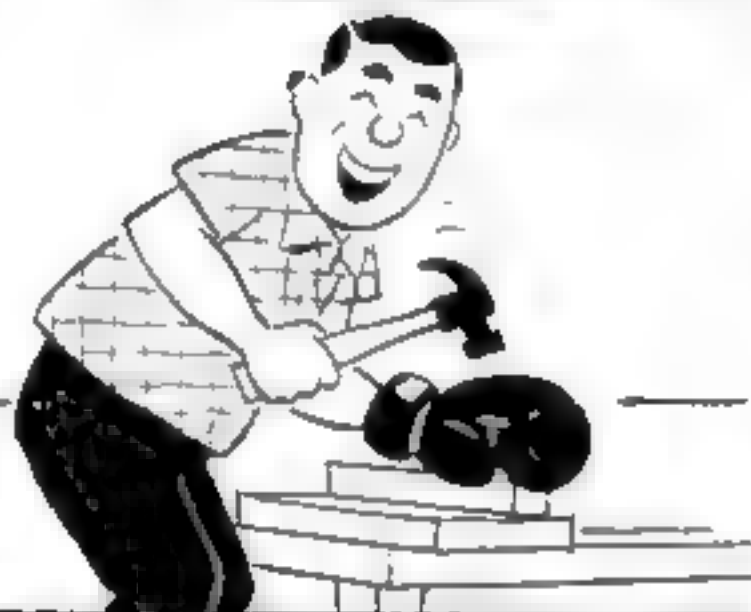
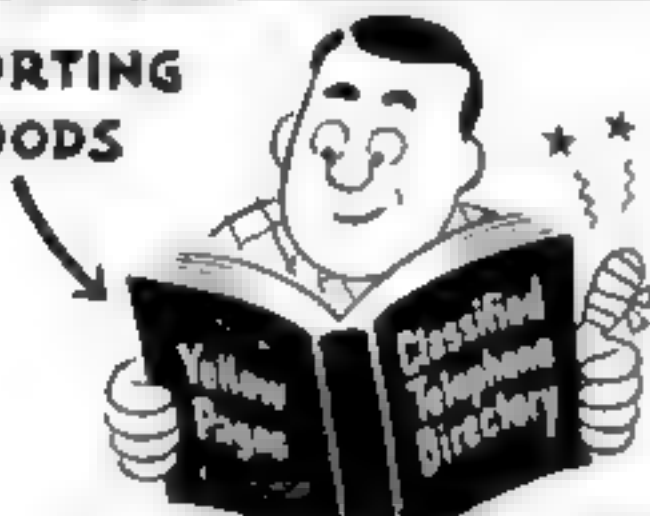
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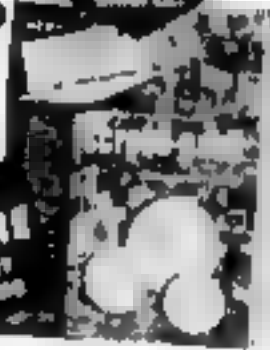
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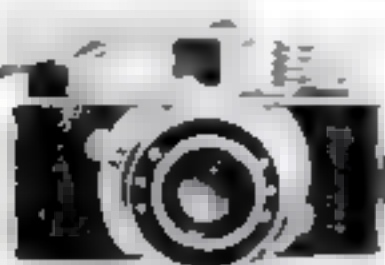
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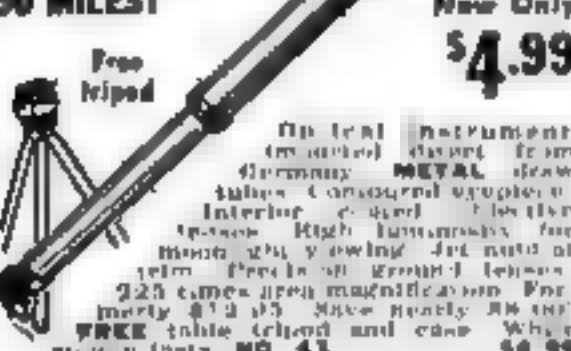
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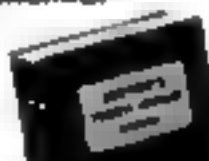
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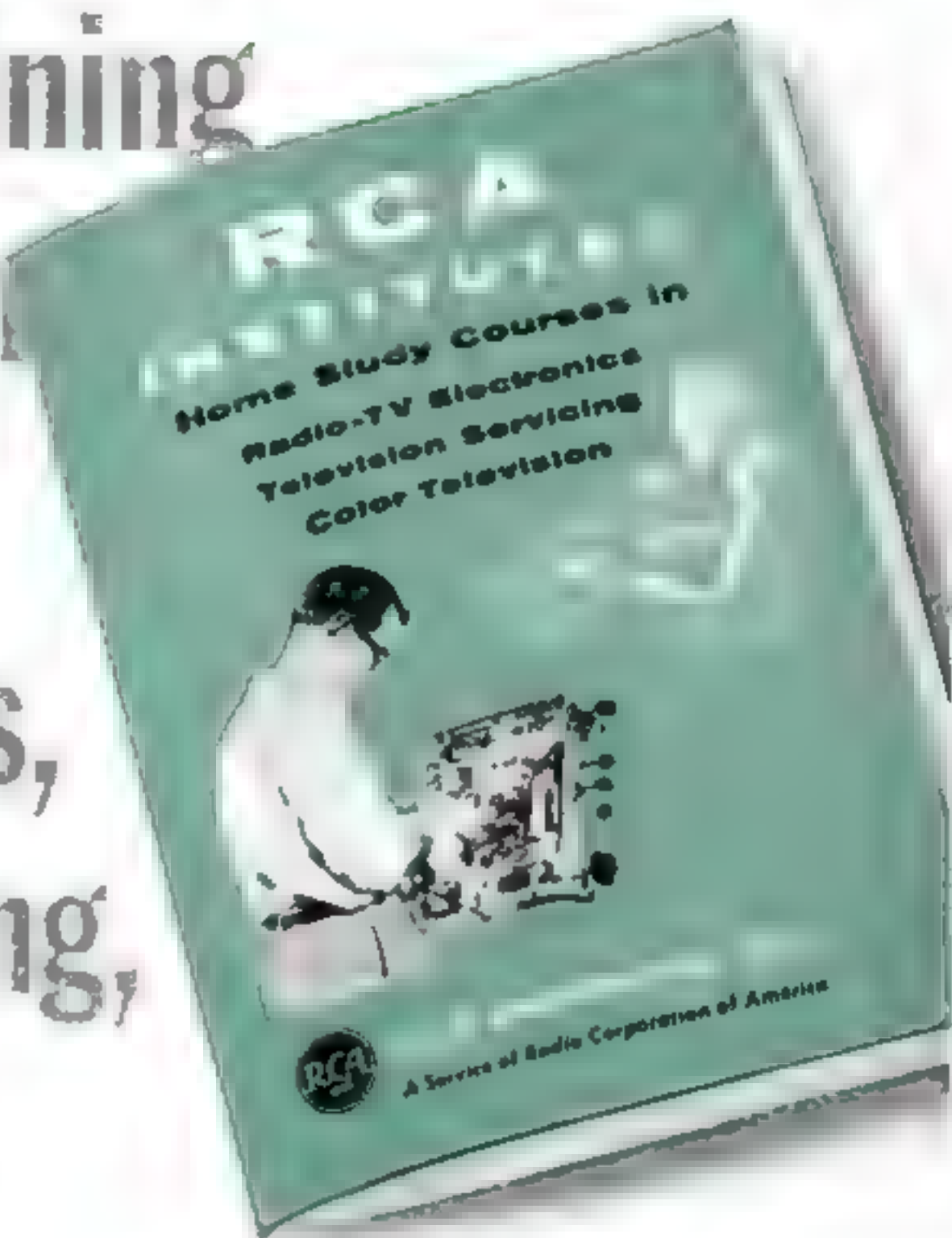
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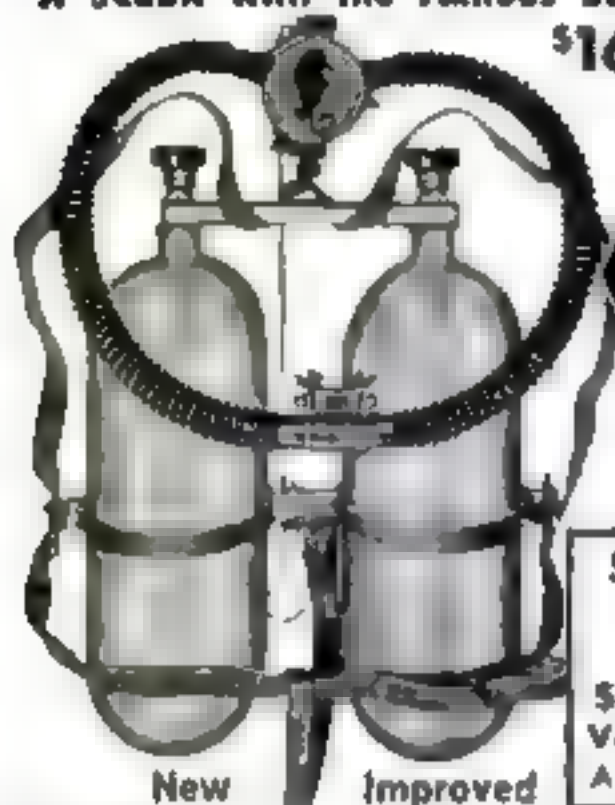
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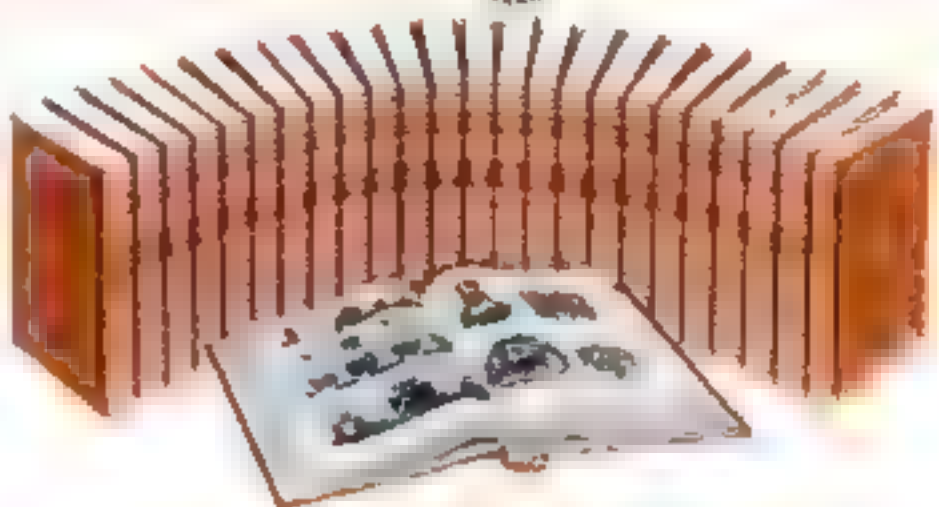


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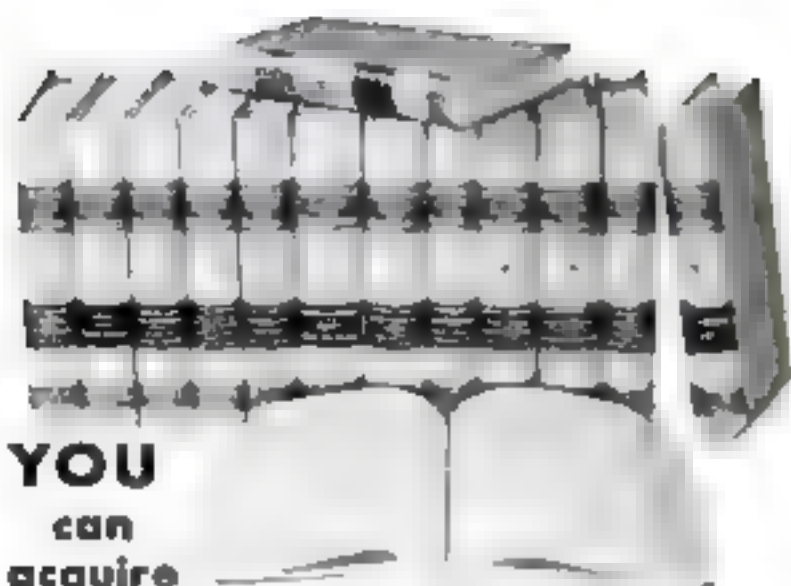
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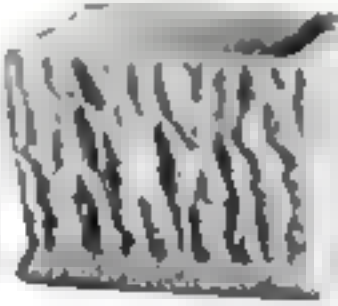
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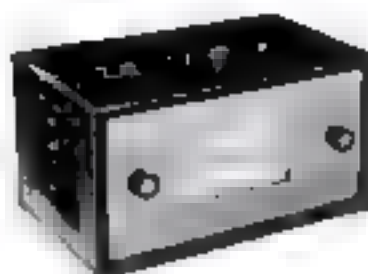
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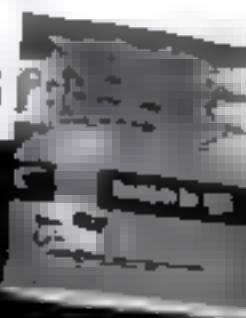
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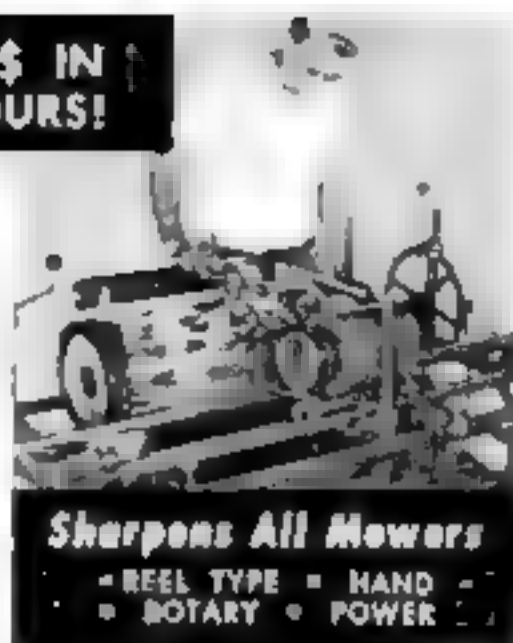
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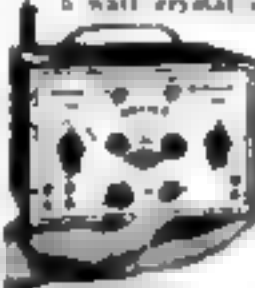
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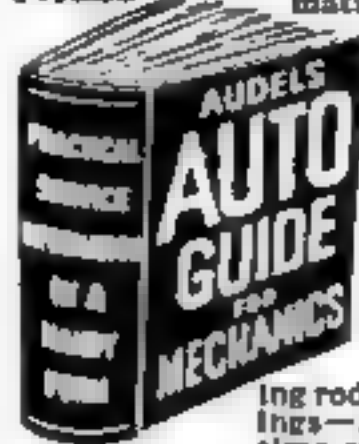
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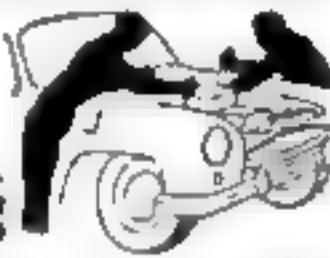
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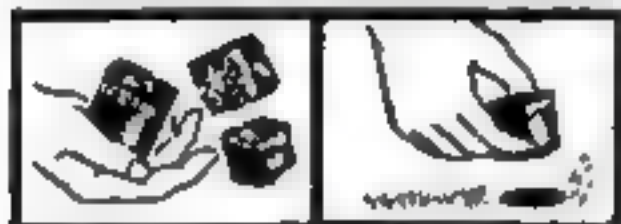
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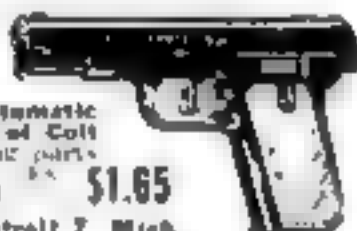
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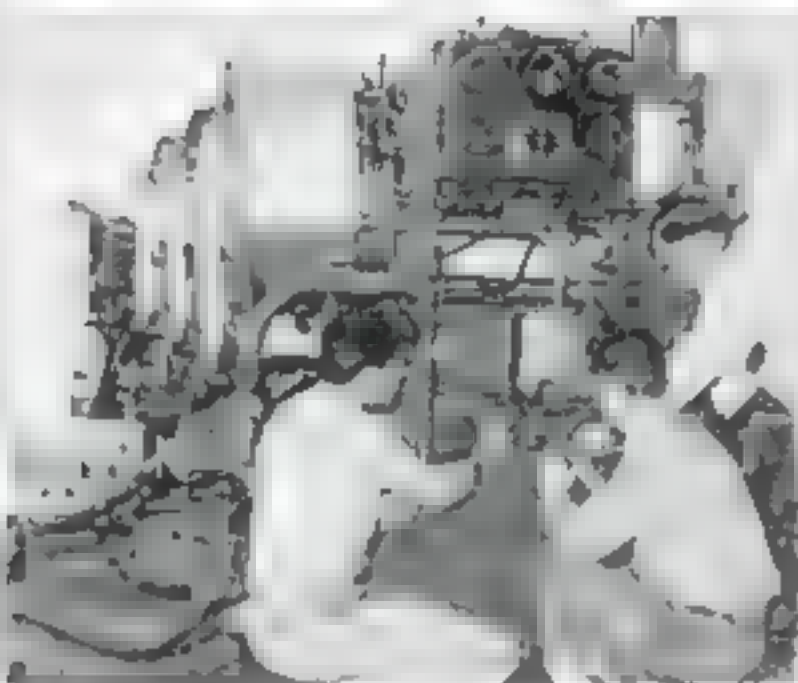
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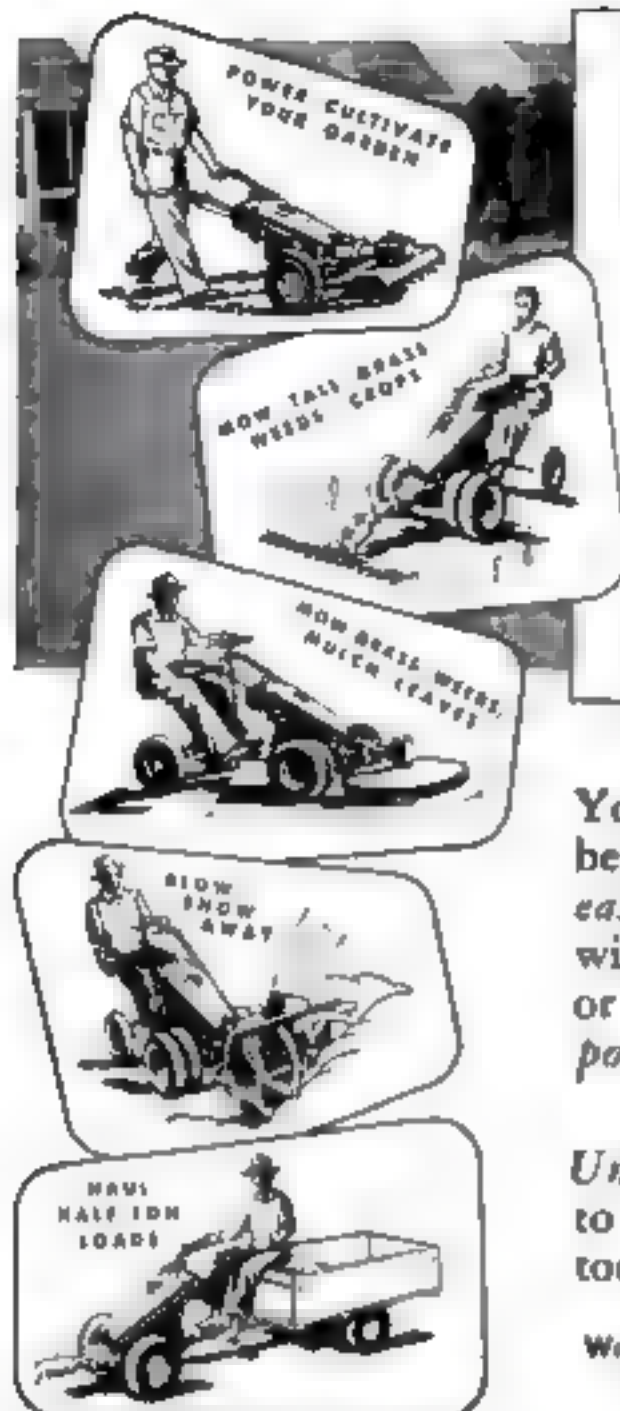
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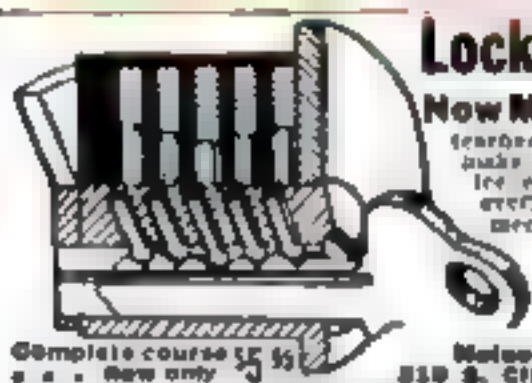
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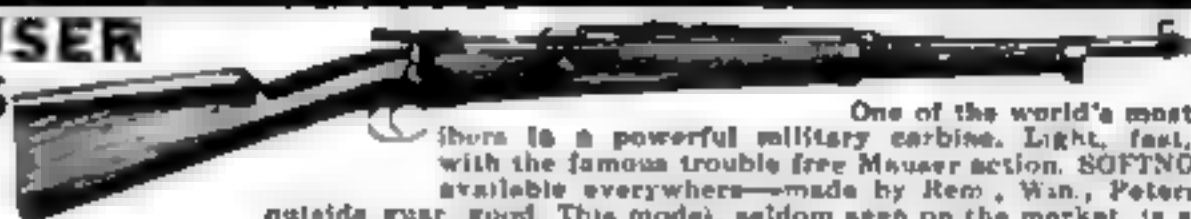
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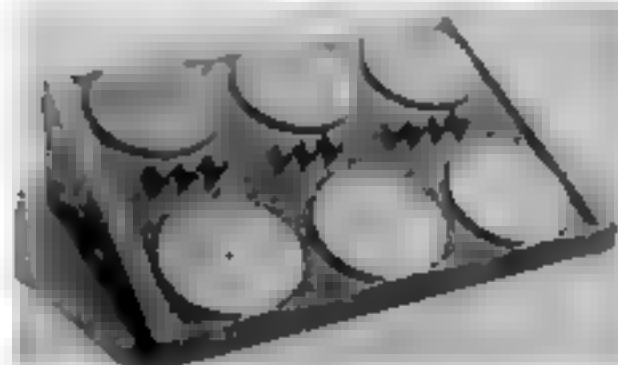
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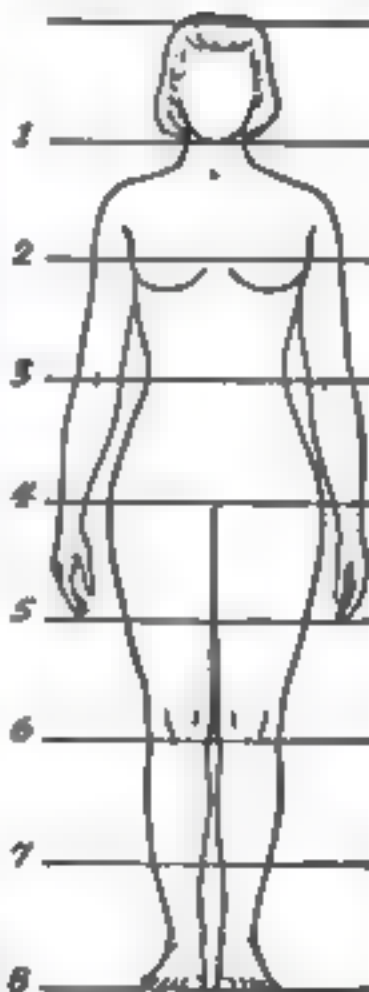
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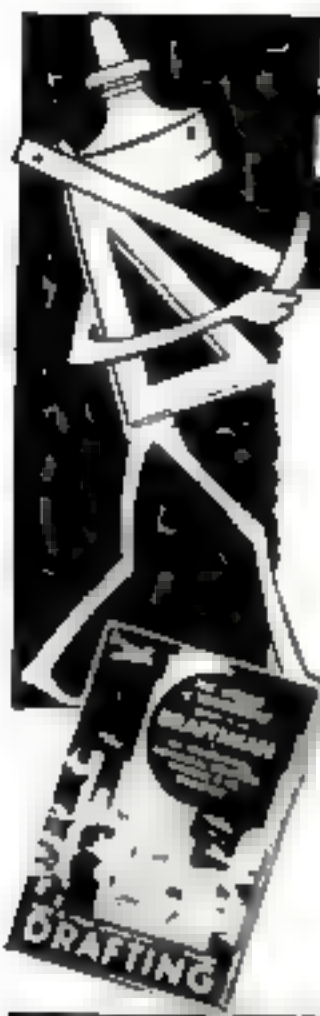
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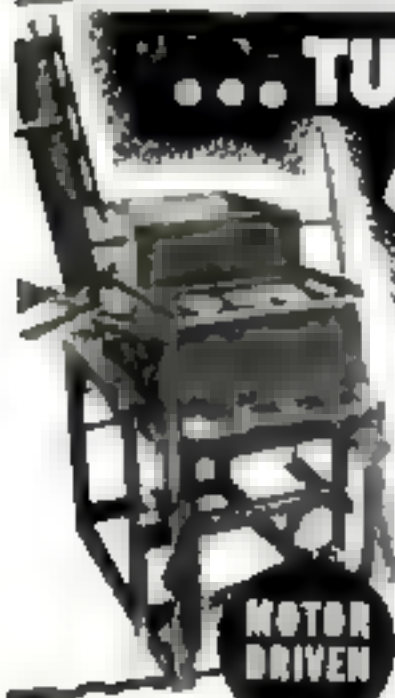
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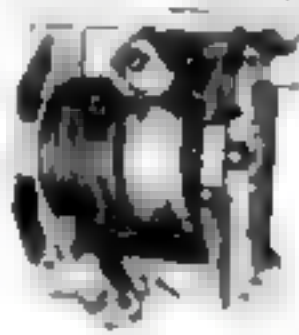
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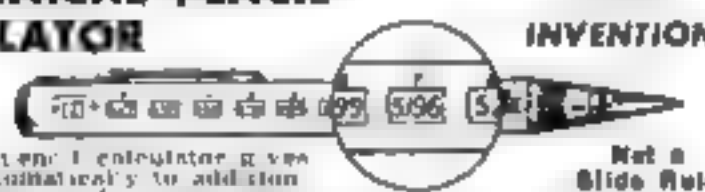
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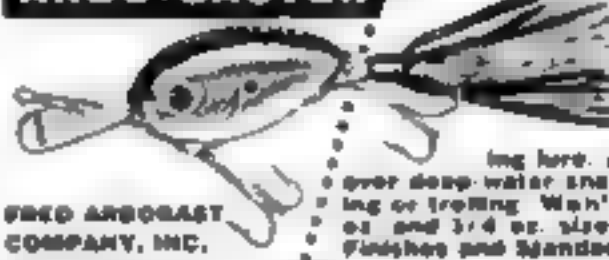
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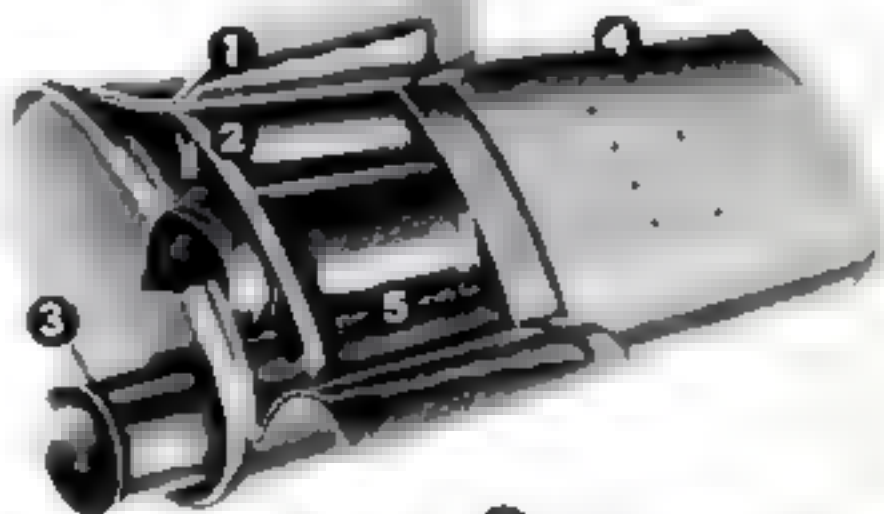
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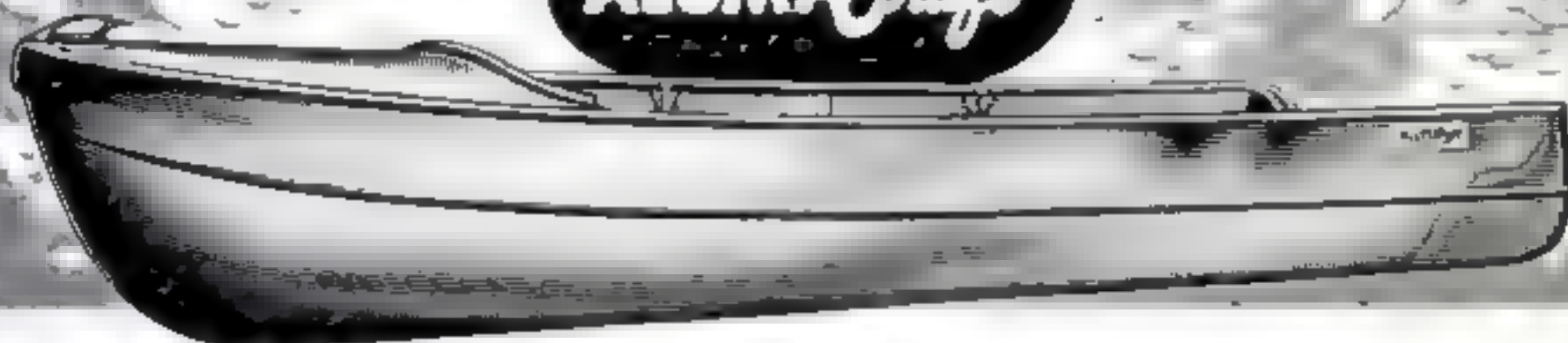
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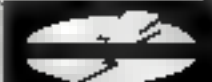
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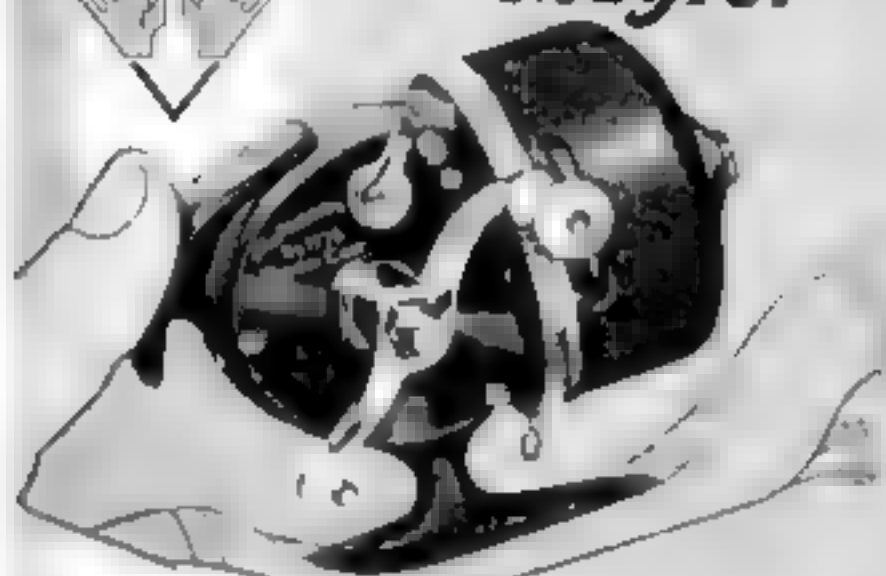


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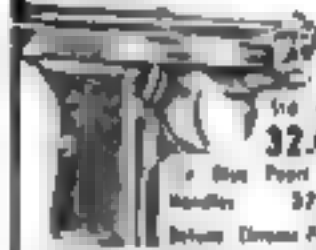
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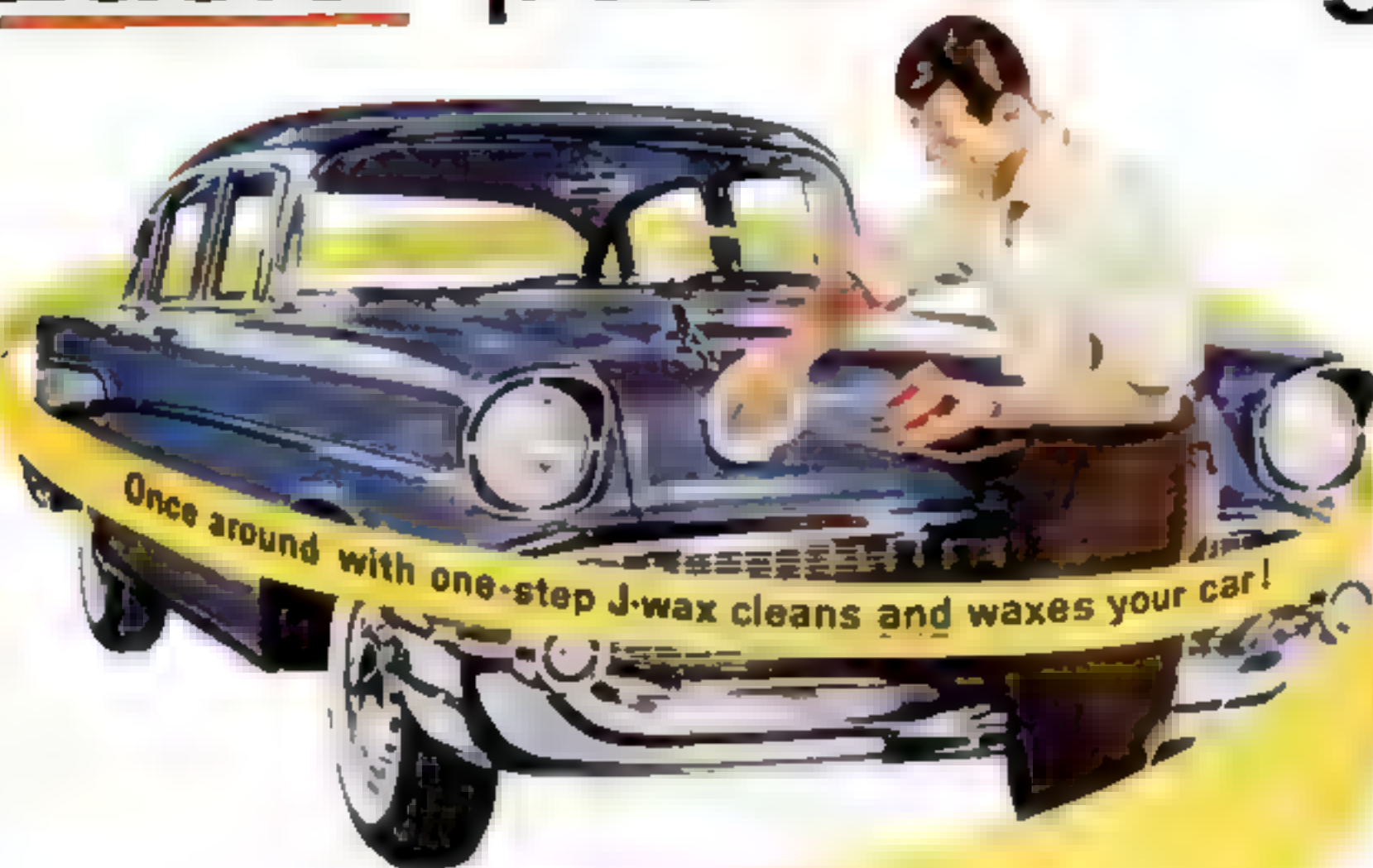
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**Detroit service experts
review drivers' reports on
the new cars and pass along
this inside advice on—**

Getting the Most from Your 1957 Car

By Devon Francis

THE owner of a 1957 Plymouth tinkered with the torsion-bar suspension—and ruined his front tires.

The owner of a 1957 Ford used his old chains on his new wheels—and banged a hole in a fender.

The owner of a 1957 Oldsmobile lubricated his vehicle religiously every thousand miles—and wasted money.

These men committed an unforgivable error—they failed to read their owner's manual tucked away in the glove compartment. Cars change from year to year. The instructions on their care and feedings are rewritten every 12 months.

What don't *you* know about your 1957 car? Are you getting the most out of it?

Some instructions and cautions can be applied to all new cars.

- Check your overhangs. If they're substantially longer than those on your old car, your rear bumper may drag with a chain-hoist tow from the front.

- It's more important than ever to

warm up your tires at moderate speeds before mashing the accelerator for long periods. The wheels are smaller and make more revolutions per mile. Tires take more punishment.

- Don't expose the new aluminum trims to caustic soaps, rubbing compounds or steam. They affect the anodic coating. If your finish is acrylic lacquer, don't use anything on the paint for the first 60 days except water. Such finishes take that long to harden.

- To get the most from your tires, at the expense of a slightly harder ride, put a few more pounds in them than the manual specifies.

- Check the fit of your tire chains. If they're too small, you'll have to buy new ones. If too big, remove some links.

- Read the manual for lube, oil and filter-change instructions. Some manufacturers have stretched the mileage between changes.

- Don't try cleaning the new paper carburetor air filters with a solvent or compressed air. They will disintegrate or rupture. Tap them on your heel.

- Check your fuel-tank capacity. Some tanks are bigger, and you may want to keep more gas aboard than you used to, to reduce water condensation and resulting engine stutter.

The following 1957 instructions, car by car, are by no means complete. They are intended to hit only some of the high spots. *Read your owner's manual.*

BUICK



A special hook is required to lift the front end for towing. When jacking for a tire change, look for a locating rivet for the jack pad on the frame; *don't* use a bumper jack. The new wide frame requires adapters on frame-contact lifts at service stations. Be careful in removing the radiator cap; the pressure is up to 15 pounds. Clean or replace the new fuel strainer in the gas tank each 5,000 miles.

CADILLAC



Check the spark-advance setting; it's ahead as much as five degrees, depending on r.p.m. The cooling-system capacity is down a bit, you may need less anti-freeze. The battery probably won't need water as often; it's cooled better. You can smoke like a furnace with the new air conditioning: There's full outside-air circulation in place of last year's partial recirculation of inside air.

CHEVROLET



If your Turboglide transmission has "HR" on the quadrant and the fellow's next door reads "GR," don't fuss. It's the same thing. In later '57 models Chevy changed its Hill Retarder to Grade Retarder to prevent anyone's thinking it meant High Range. For push starts, shift from Neutral to GR at 25-30 m.p.h. For warm-engine starts with fuel injection, press the accelerator clear to the floorboard while cranking; it keeps enrichment to a minimum. Remove and replace tires on the new, smaller rims from the inboard rim side only; the outboard side of the rim has a bigger bead seat area.

CHRYSLER



In adjusting car height with the hex nut on the torsion bars, be certain to re-check the wheel alignment; changes in bar tension affect the front-end geometry and can result in excessive tire wear. Drain and clean the radiator in the spring and fall. With air conditioning, you will need permanent antifreeze in your radiator even during the summer to keep from freezing the water in the heater core. Change the paper element in the air filter each 15,000 miles; see the admonition above on cleaning it.

DE SOTO



Most of the instructions on Chrysler apply also to DeSoto, Dodge and Plymouth. Your engine oil capacity is up one quart to five, your cooling-system capacity (with heater) down three quarts to 21. The spark advance on the FireDome is six degrees before top dead center; both the FireFlite and the new FireSweep engines are also advanced to six degrees.

DODGE



Twenty-two pounds rear, 24 front, is specified for the tires; better add at least a couple. The same figure is used for all other Chrysler Corporation cars, the Plymouth V-8s excepted. On Dodge station wagons, be sure the window is lowered fully into the gate before lowering the gate. Penalty: breakage. The spark advance on the six-cylinder is zero; that on the Coronet V-8, six degrees. Don't fiddle with the innards of the air conditioner; if moisture gets in, it will freeze and you've got trouble.

FORD



You no longer have to drain the oil to change the filter; a check valve retains it. The clock is self-regulating but requires some resetting, it runs faster each time you set it ahead, slower when you set it back. Your gas-tank capacity is 20 gallons, up 2½ in a sedan or coupe, one in a wagon. The filter on the fuel pump should be changed each 5,000 miles; it can get clogged. The hood latch now opens from the driving compartment. Don't use any type of cleaning fluid on the vinyl convertible top (and did you know how easily that rear window zipper will work if you rub it now and then with a bar of soap?).

HUDSON



Your V-8 now requires premium gas. The company recommends a 24-pound tire pressure all around. Your old chains may fit, but check. In Low Range with a Hydra-Matic, stay below 35 m.p.h. to prevent an upshift from second to third gear. The change from Drive to Low Range can be made at any car speed, but "L" will not engage until the car gets below 43 m.p.h. Don't engage Reverse at forward speeds above five m.p.h. Your differential takes four pints of lubricant, up a half-pint, and your cooling system's capacity is 20 quarts—down two from last year.

IMPERIAL



The spark advance is six degrees before top dead center. Your cooling system capacity is 25 quarts, up one, your gas capacity 23 gallons, up two. The new TorqueFlite transmission takes 10½ quarts, a pint less than the PowerFlite. The transmission automatically shifts to Neutral if the Reverse button is pushed above 10 m.p.h. The magnetic-clutch brushes on the air conditioner should be checked every 10,000 miles.

LINCOLN



Some models are 500 pounds heavier, and the factory recommends more care than ever in "breaking in" the brakes. A minimum of 250 "burnishing stops"—moderate brake applications from 40 m.p.h.—should be made, as many as 400 if possible, at intervals at least a mile apart. That flashing light on the fuel indicator means you have about four gallons left. If you turn the switch on the electric door locks, and the light doesn't go off, remember there's a door open.

[Please turn the page]

MERCURY



Tap the dirt off that paper carburetor air cleaner each 4,000 miles. There's a change in engine oil specifications. Now, Merc says, use "MS" or "DG" heavy-duty detergent oil. The controls for the heater and air inlets are now separate. Don't worry if, when you press the windshield-washer button, the wipers make 12 or 14 swipes after the water shuts off; it's a coordinated control. Clean the air filter on the air conditioner in warm water at least once a month. Don't drain out the factory-supplied differential lubricant. And there's no longer a seasonal or periodic refill. When needed, use a hypoid gear lube specified by the factory; it contains a sulphur-chlorine-lead additive.

NASH



Your car is now four-eyed: On high beam, your upper headlight is on the high-beam filament, and the lower headlight is on. On low beam, the upper headlight is on the low-beam filament, and the lower headlight is off. Gear engagement for a push start with an automatic transmission used to be 20 m.p.h. or above; now it's 30. Multi-viscosity oils are okay. Fuel is now premium.

OLDSMOBILE



You'll need new tire chains probably. Lube your car each 2,000 miles instead of the former 1,000 (but first see page 172 of this issue). The rear overhang on the 88 and Super 88 is up four inches, that on the 98, 3½. The air cleaner can go an extra thousand miles—6,000—between cleanings. Clean the crankcase breather cap when you change the oil. You can go 8,000 instead of the former 7,000 miles between front-wheel repackings. An extra thousand miles—6,000 in all—is recommended between wheel switching.

PLYMOUTH



Recommended tire pressures differ from those for the rest of the Chrysler Corporation's cars; it's 24 pounds in front, 22 rear, for the V-8s. But it's 22 pounds for the Six. Your fuel capacity is up three gallons to 20. That rumor that the torsion-bar suspension needs adjusting each 2,000 miles is eyewash. If you've got a pot that has four barrels, use a premium gas. The multi-viscosity engine oils are okay.

PONTIAC



Oil-pump pressures are down; where the top used to read 80 pounds, it's now 60. A spare 7½-ampere fuse is now clipped to the bottom of the fuse box. With a manual transmission, pressing the accelerator to the floor presets the automatic choke and throttle for cold starts. Cooling-system capacity is down to 23½ quarts, even with air conditioning, and the seven-pound radiator pressure cap is replaced with a 13-pounder (15, with air conditioning).

RAMBLER



The V-8 drinks regular gas, like the Six. The cooling system takes 21 quarts with heater, almost twice that of the Six, and the crankcase five quarts, less filter. Pump up those tires to 24 pounds. Your chains will probably fit.

STUDEBAKER



A first this year is the disposable oil filter you can change yourself. It's coated with an abrasive on top so you don't need tools—work it off by hand; screw a new one in. Its life is 5,000 to 6,000 miles. If you own the Golden Hawk (or Packard Clipper), check every 1,000 miles on the automatic-transmission fluid that lubes the supercharger. END

Detroit Report:

What's Coming in 1958 Cars

THE chips are down. Detroit's tooling for the 1958 crop of cars is almost finished. From now on, all that the stylists will be permitted to do is move a little chrome around.

The model year of 1958, to be ushered in this fall, will introduce the first new brand name in cars in more than seven years—discounting the Packard Clipper and the sports cars. Ford Motor will bring out its *Edsel*. The last time that an event like this occurred was in 1950, when Nash unveiled its Rambler.

The Edsel will come in four "series" or lines. The top two—called the Citation and Corsair—will be built on a Mercury frame. The bottom series—Pacer and Ranger—will go on a Ford frame. Fourth car in the Ford stable (sixth, if you include Thunderbird and Continental), the Edsel will sell—according to Detroit scuttlebutt—for \$2,200 to \$2,700 f.o.b. factory at the low end; \$3,000 to \$3,500 at the high end.

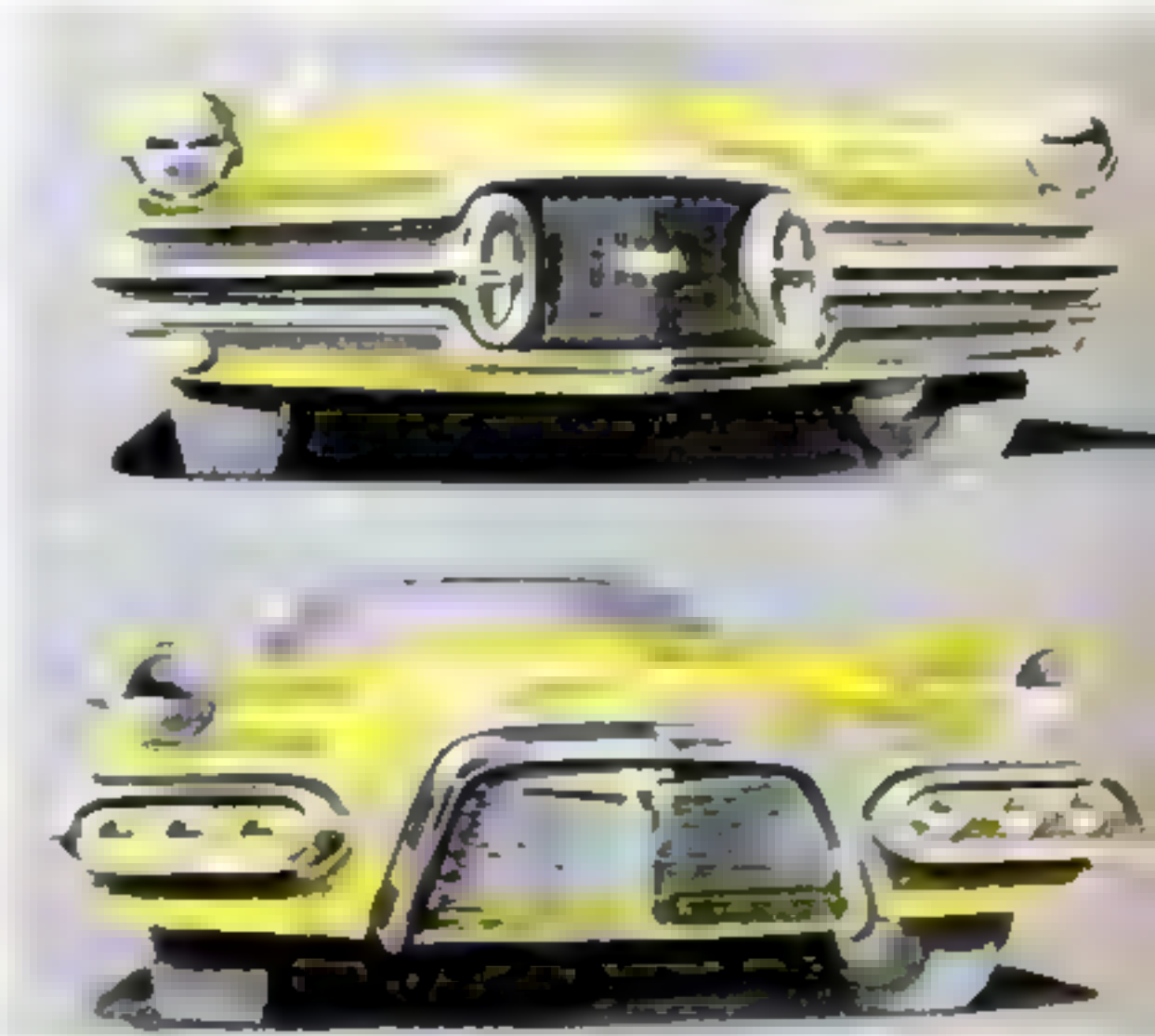
Chevrolet's regular lines of cars for 1958 will be drastically restyled. The silhouette will be dropped four to five inches. But that familiar tuck in the sheet metal at the belt line will be retained. Fins will enclose the rear deck, but they will be conservative.

Chevrolet will bring out some version of the *Impala*, the fancy-pants show car, with Corvette in its ancestry, exhibited at the GM shows in 1956. The sages say there will be a new V-8 engine.

Big changes are due for American Motors' *Rambler*, too. A lot of people inside the company don't cotton to the gingerbread look of the 1956-57 version. And it's going to surprise those prophets who keep dooming the Nash and Hudson to extinction when both appear this fall in sparkling new dress.

Lincoln in 1958 is going to the "unitized" construction pio-

Edsel in Evolution



Hottest question in Detroit this spring is: What will the new Edsel look like?

These two sketches by Ford Motor Co. stylists were among those from which the final appearance of the car was evolved. But the production design will be secret until late summer.

neered by Nash. That means the entire absence of a frame, as such. The frame for the body becomes the frame for the entire car. In manufacture, the body is dropped onto the running gear, locked there—and that's it. This may well forecast things to come at Ford Motor. The *Thunderbird* will be next to abandon its frame.

Chevrolet has been flirting with the same idea. Its current firewall- and instrument-panel construction is a step in that direction. When work on new Chevy assembly plants in Ohio and California suddenly was stopped some months ago, the rumors swept Detroit that this GM division was torn between adopting Cadillac's X frame and going frameless altogether.

Pontiac in 1958 will have its own body shell for the first time. A sheet-metal panel or two will be shared with Chevrolet, but the duplications will be minor.

The *Studebaker* will be sheathed in new sheet metal.

There will be a "big" *Mercury* in 1958. It may bear a series name plucked from a list of 2,000 submitted for the car they finally decided to call the Edsel. The big Merc in some measure will overlap the Lincoln in price. It will compete with the Olds 98 and the Buick Roadmaster.

Something exotic is in the offing for the plush *Continental*. Brought out as Ford's prestige car for the 1956 model year, it has not found enough coarse money among buyers to pay its way. There are reports that it will appear as a four-door sedan or hardtop, with more room inside, to make it more acceptable to people having \$10,000 to spend.

Optional air suspension will probably be available on some Ford

Motor and GM cars in 1958. There are also indications that disk brakes will again be offered; almost every company is working hard on brakes. Lincoln, among others, is thinking of air brakes.

Look for a growing adoption of fuel injection in 1958. At least three systems are proved and ready for manufacture—the Bendix, going into a limited number of Ramblers this

spring and, later, into some Chrysler Corp. cars, the American Bosch; and the Simmonds, under current study by Ford, Buick, Oldsmobile, DeSoto and Chevrolet. One Ford engineer said the trouble with *all* fuel-injection systems was cost—the car buyer would have to ante up \$500 for a unit. Actually, Ford's own estimate of manufacturing cost on a volume basis for one kind of unit is \$50.

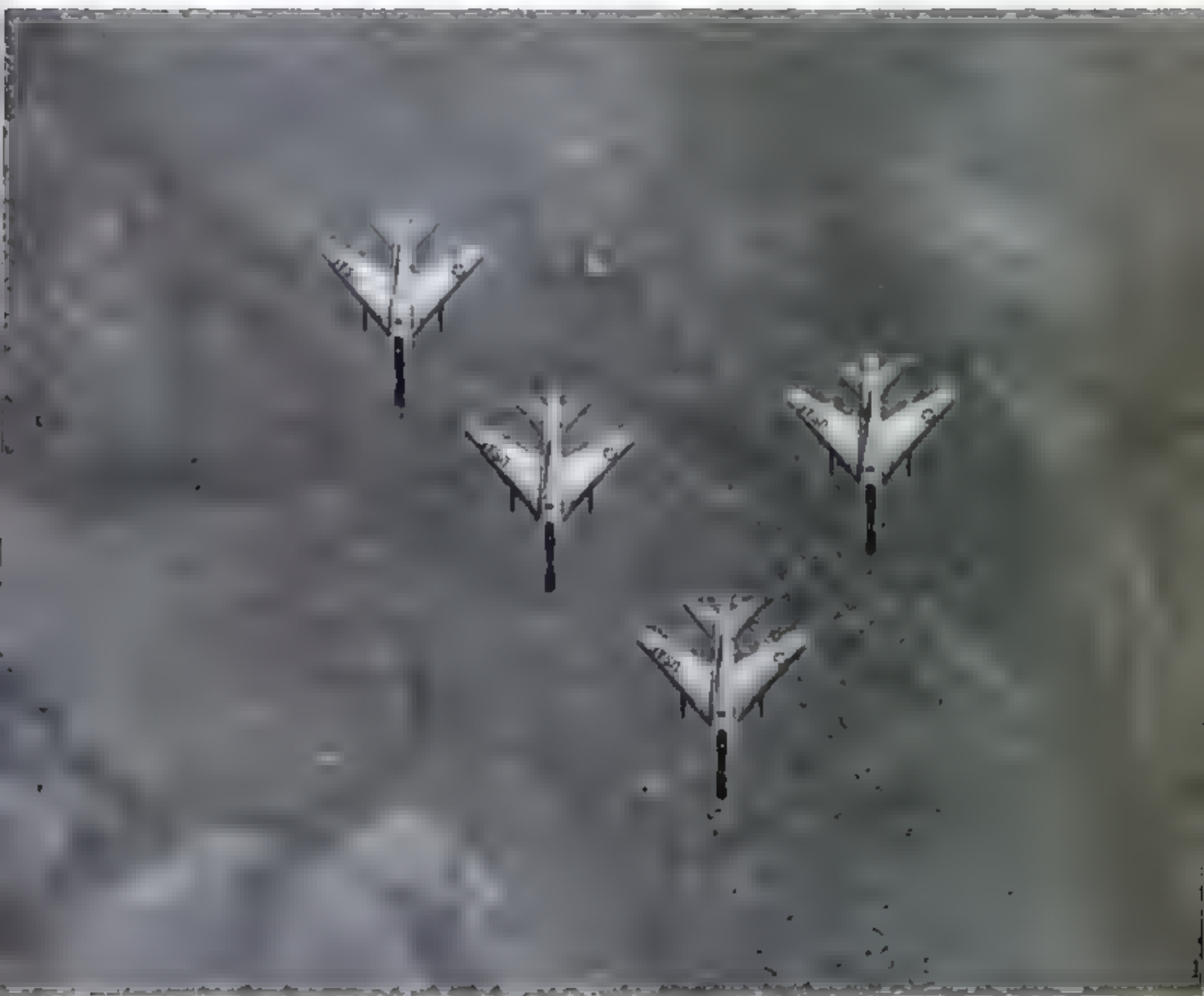
A big push will be made by all the Detroit manufacturers on the sale of air conditioners in 1958. The motormakers suddenly discovered that Texas manufacturers of air conditioners for cars were striking gold. Prices are dropping. Factory-installed units, including a heater, come as low as \$345, and "hang-ons" installed by the dealer and *not* including a heater, even lower.

[Continued on page 280]

NEXT MONTH: In the market for a brand-new automobile? Don't miss "How to Buy a New Car" —a 16-page booklet included in your copy of May POPULAR SCIENCE. This step-by-step guide covers every angle—trading in, dealing with dealers, insurance, financing, extras, servicing—and shows you how to get the best deal for your money.

Ready to roll from hidden hangars—

U. S. Jets Keep Watch on the Rhine



Four North American F-100 Super Sabres fly over the Rhine in American Zone of Germany.

U. S. AIR Force Day Fighters of 36th Group—the famous F-100 Super Sabres—are stationed at Bitburg and Hahn, in Germany, and at Soesterberg, in Holland. They are supersonic jets, armed with rapid-firing 20-mm. cannon.

Their mission: to provide quick reinforcement for any “brush-fire” war that

might break out suddenly in Europe or the Middle East. Their presence clearly shows all observers—friendly or otherwise—that the U. S. Air Force is on the spot, ready to go, so that mistakes in power-grab calculations are not so likely to happen. Other F-100s, able to deliver atomic bombs, are based in France, 100 miles behind Bitburg.—*Frank Harvey.*

For more pictures of the F-100, turn the page

APRIL 1957 89

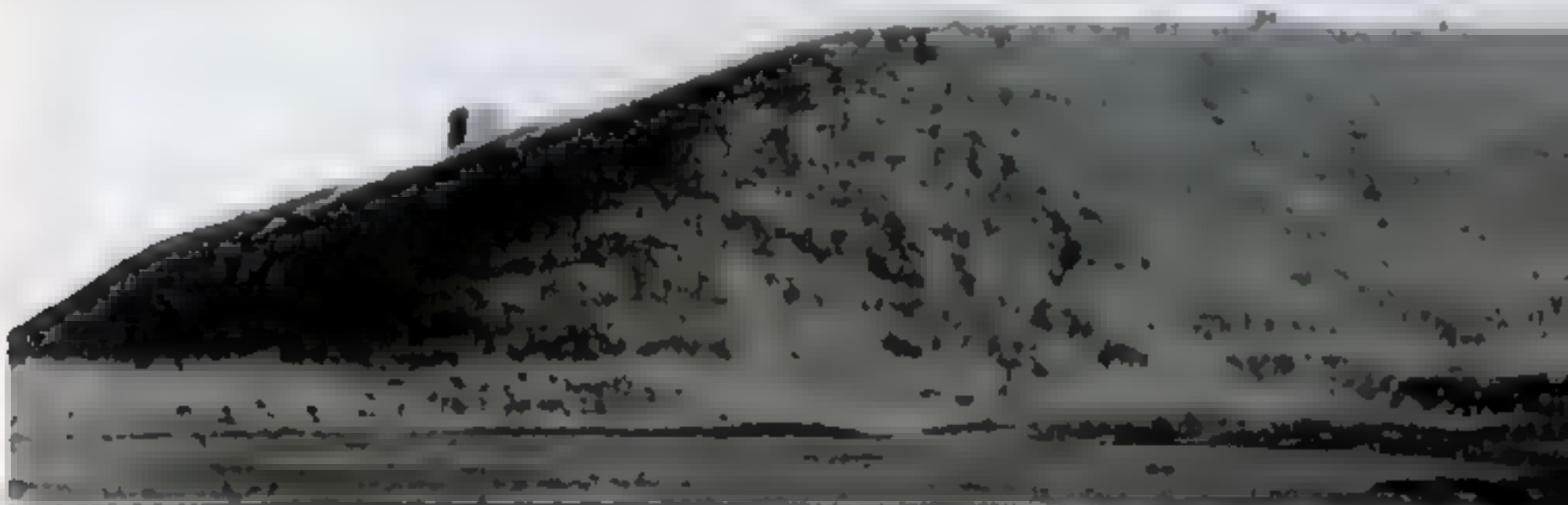
"Watch on the Rhine"



HOT TO TROT: Jet pilot signs in on Alert bulletin board. He's buttoned into his G-suit, and his F-100 waits in concrete cubbyhole on lower level. Note the silhouettes of Russian planes.



GROUND POWER UNIT, to start jet engines, is flicked into action by men who get least share of glory—the plane handlers. They live in hangar, never more than seconds away from job.



Huge mound is the "Zulu" hangar. Zulu is Air Force lingo for "Ready Alert." Deep dirt fill



FOUR 20-MM. CANNON go off at once on bore-sighting range. Bullets must strike in small circle at 1,000 feet. F-100's split-second firing time makes a fast rate of fire essential.



SUPERSONIC FIGHTERS STAND inside the Ready Alert hangar at Bitburg, Germany. Blast doors, which show black in the photograph, bleed off the superhot gases from fighters' tailpipes. Mas-



SHOOT ME THE JUICE! Pilot signals with a thrusting finger from the cockpit of his F-100. Five minutes from now he'll be tooling along high over Germany at close to the speed of sound.



AND AWAY FOR A LOOK-SEE. With their speed and ceiling, the F-100s can tackle high-flying bombers or fighters; with mid-air refueling, they can strike deep into enemy territory.



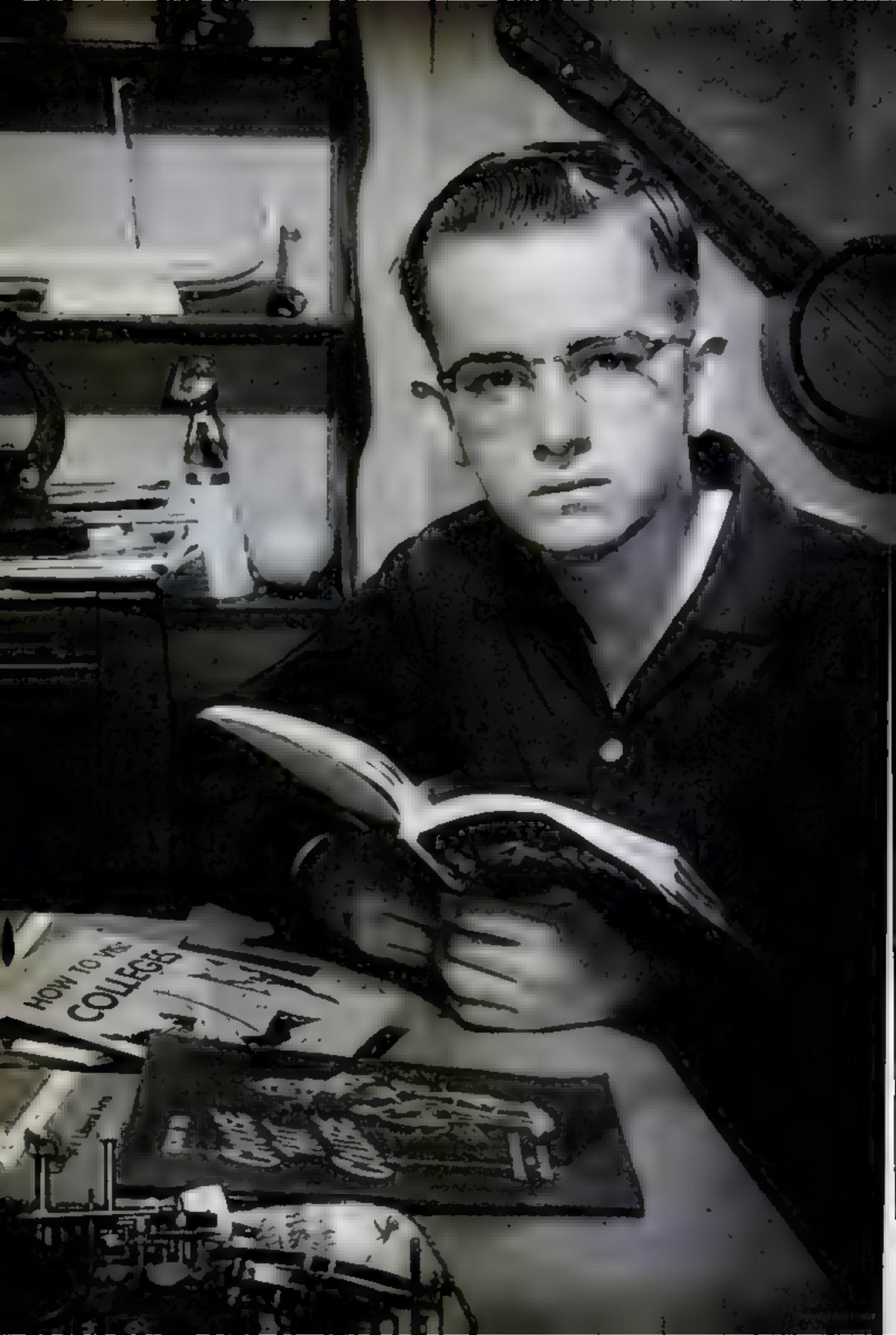
around three sides of the camouflaged hangar protects planes from anything but a direct hit.



sively built of concrete and earth, these ingenious cave-type hangars also give protective housing to standby pilots, the F-100 handlers and their maintenance equipment.



IF THE TRAINER LET GO, this K-9 dog would do some serious chawing on sergeant (not shown) flailing at him with a stick. These dogs are taught to distrust every man who walks. **END**



Can Your Youngster Get into College?

It isn't easy, and it's going to get harder. Here is what you can do, starting now, to help your son or daughter qualify.

By D. R. Lindsay

AT THE very time when industry, in its hiring, tends more and more to demand college graduates, it is rapidly growing harder for all but the brightest boys and girls to get into college.

You've undoubtedly read or heard that the competition is getting tougher. You have probably asked yourself, "Can my youngster get into college?"

The answer now, and for a short time to come, is still "Yes."

If your youngster will graduate from an accredited high school within the next six years and if you and he start seriously planning early enough, he can be admitted to some college. After 1963,

though, at which time the huge throng of postwar babies begins to reach college age, there may no longer be room enough for all qualified applicants.

Even today, getting into college requires long-term, careful planning, and this will become increasingly important as more and more high-school graduates try to go. Unless your youngster is extraordinarily bright, you are going to have to help him in many ways besides arranging loans and signing checks.

Why?

Because unprecedented crowding has forced most colleges to be far choosier than ever before. As the crowd of applicants swells, colleges will become increasingly selective. Even now, thousands of students are being refused by

How You Can Help Us Write These Articles

This is the second article in Popular Science's unusual series designed to help parents do a better job of guiding their children toward the kind of education and career most suitable to their abilities and interests. The right choice is bound to benefit the youngster and the nation, which, with our increasingly technical civilization, needs trained citizens more than ever.

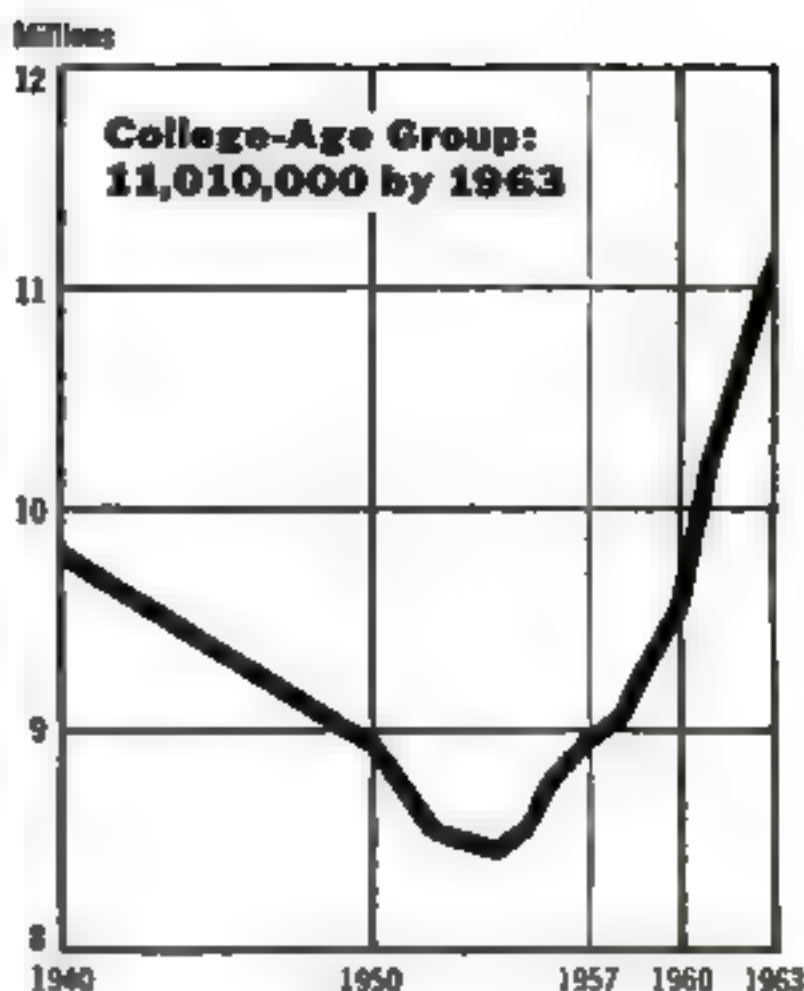
We have gone to the best authorities we could find for information and advice. But the subject of education is huge and complex. The experts themselves often disagree. They don't have all the answers.

If, in reading this series, you do not find the specific advice you need on some particular phase of your own family's educational problem, let us know. If possible, we will answer your questions, either directly or in future articles.

Next month: "Is Your Youngster a Budding Scientist?"

Why getting into college is getting tougher...

These graphs are based on projections of data in *Teachers for Tomorrow*, published by the Fund for the Advancement of Education. Estimates of future college enrollment assume that proportion of college-age youngsters who actually enroll in college will keep rising at the rate of two percent a year, as it has since 1954.



the schools they want most to attend.

Last year, Dartmouth had five applicants for every place in its freshman class. Caltech had almost as many. Yale had four; Princeton, six. Mt. Holyoke College took in only one girl out of every five who applied; Smith College, one out of four.

Even one of the biggest schools in the U.S., New York University, accepted only one applicant out of every three.

These all are private institutions. But the state-supported universities, sharing in the crush of applicants, are getting restrictive, too.

The University of Colorado insists not only that applicants pass College Board exams but that they be in the upper two-thirds of their high-school classes. The University of California, the nation's largest, demands a B average from high-school graduates seeking admission. The University of Michigan, planning in 1959 to start requiring applicants to pass College Boards, already has begun limiting the number of out-of-staters admitted. The University of Massachusetts no longer accepts *any* out-of-staters, furthermore it is thinking of admitting only students who have ranked in the top 20 percent of their high-school classes.

Today, 3.2 million young men and women—nearly one-third of the college-

age population of the U.S. (see graph on page 95)—are enrolled in colleges. That's an all-time record.

Despite this fact, there is still room for the high-school graduate of average scholastic ability. The room exists primarily in private colleges that are not widely known, and—for the time being—in state universities.

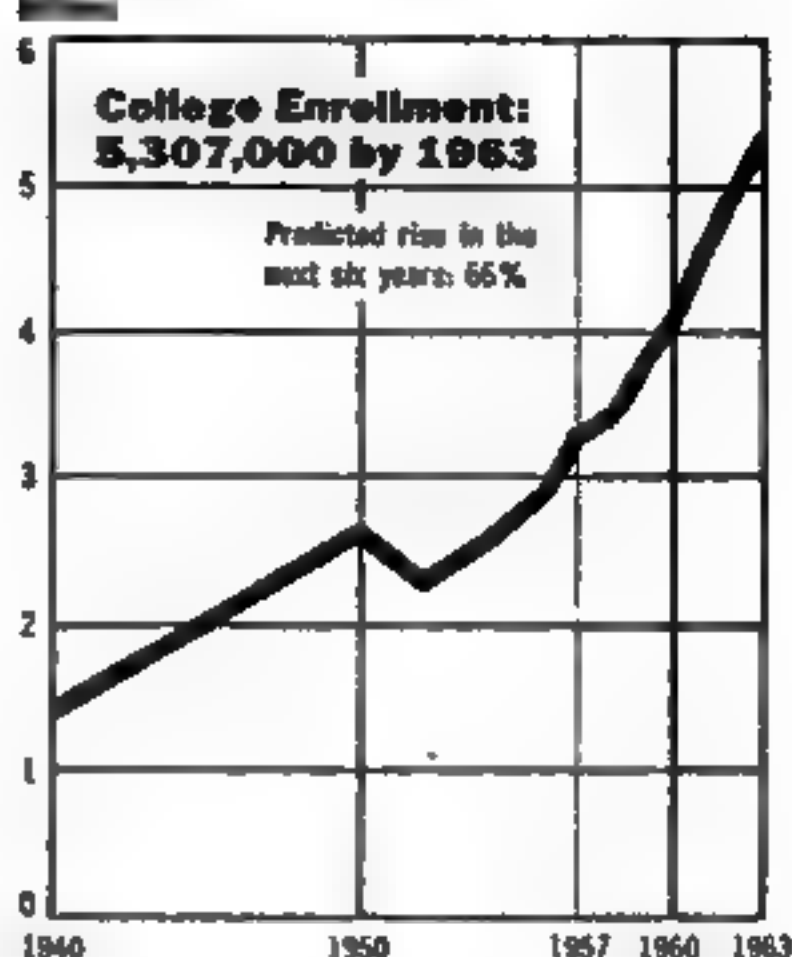
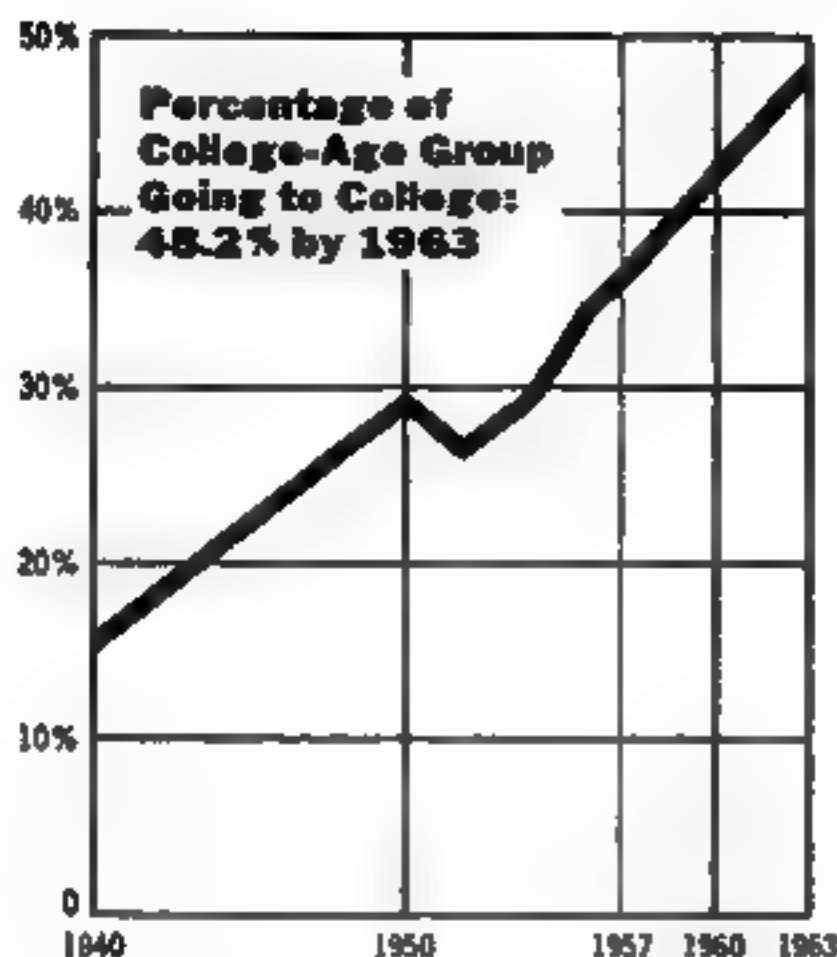
A 1956 survey in Illinois revealed that private colleges in that state alone could accommodate an additional 25,000 to 30,000 students. The Council for the Advancement of Small Colleges, with headquarters in Washington, says 54 of its member schools throughout the nation can absorb 50,000 more students.

But by 1963, if the U.S. population continues to grow at its present pace and the proportion of young men and women going to college keeps on increasing at its current rate, U.S. college enrollment will hit 5.3 million. That's a 66-percent increase—in six years!

New campuses are already being built, and old ones expanded, but the outlook for 1963 is for a very tight squeeze to get all the would-be college students in. After that? The prospect is dark indeed.

Even now, there is not much margin for error left to applicants.

First, you and your youngster must



try to answer two important questions: Is he really capable of doing college work? Is college the best training for the career you and he envisage for his tastes and talents?

Tough questions? Yes, and they call for objective answers from you both. Ask your youngster's present school for help. Many schools now regularly give intelligence and aptitude tests. If your youngster's school gives these tests, you can quickly get a realistic guide to his ability to handle the load of college subjects. If it does not give the tests, it can tell you where your youngster can get them. Also, your child's teachers can give you expert estimates of his prospects as a college student.

You must face the possibility that the verdict of tests or advisers will be that your youngster should *not* go to college but should instead take vocational training. A subsequent article in this series will discuss aptitude tests and vocational guidance. Another will explore the field of desirable careers for youngsters who train for specific vocations instead of going to college.

If tests and interviews have convinced you and your youngster that he *can* make the grade in college, it is then largely up to you to see to it that he *wants* to go. You must create a family

atmosphere in which it is completely taken for granted that he *will* go to college. This involves establishing a broadening way of life for him that ranges all the way from introducing him to good books to encouraging him to go to dances. You must foster both the intellectual and the social aspects of his life.

While that essential groundwork is being laid, follow this specific procedure:

1 As early as possible—preferably at the time he is ready to enter the ninth grade—help him decide what courses he will take in high school. These should pave the way to the kind of college he and you think he should shoot for.

He must take a college-preparatory curriculum, naturally, but make sure that it includes not only the minimum requirements but also the electives recommended by the type of college he is considering.

The standard college-prep curriculum includes enough English, social studies, elementary math and introductory science to get a student into the liberal-arts branch of the average state university. But many liberal-arts colleges are likely to demand languages as well, and extra social studies.

Without additional math and science, however, the standard college-prep cur-

This is what College Board exams are like

Questions like these appear in each year's Scholastic Aptitude Test of the College Entrance Examination Board. Each test has a Verbal section and a Mathematics section.

Careful study over many years has shown that tests of this kind often improve the accuracy with which colleges can forecast a student's academic achievement. Though subject to error, like all tests, the College Boards have proved to be a useful supplement to an applicant's high-school record and other personal data in helping colleges judge his merits fairly and accurately.

VERBAL

Directions: Each question below consists of a word printed in capital letters, followed by five words lettered A through E. Choose the lettered word which is most nearly *opposite* in meaning to the word in capital letters.

1. UNFIT: (A) tight (B) qualified (C) chosen (D) serene (E) necessary

2. ADAMANT: (A) unsympathetic (B) moist (C) modern (D) yielding (E) pressing

3. EXULT: (A) commemorate (B) welcome (C) change (D) deny (E) mourn

Directions: Each of the sentences below has one or more blank spaces, each blank indicating that a word has been omitted. Beneath the sentence are five lettered words or sets of words. You are to choose the one word or set of words which, when inserted in the sentence, *best* fits in with the meaning of the sentence as a whole.

4. If your garden plot is small, it will not pay to grow crops which require a large amount of in order to develop.

(A) moisture (B) rain (C) fertilizer (D) space (E) care

5. If there is a long succession of styles between the earliest style and the latest one, the can appear in a new disguise without being detected.

(A) style (B) earliest (C) latest (D) succession (E) worst

6. The average uneducated person does not distinguish between science and invention, and lumps together those whose work is wholly directed toward ends with those who are out to discover principles without much regard for their utility.

(A) inevitable (B) theoretical (C) ideal (D) practical (E) obvious

7. The fathers of the Constitution were : the Constitution did not create rights, it recognized them.

(A) originators (B) recorders (C) debtors (D) lawyers (E) wrong

Directions: Each of the questions below consists of two words which have a certain relationship to each other, followed by five lettered pairs of related words. Select the lettered pair of words which are related to each other in the *same* way as the words of the original pair are related to each other.

8. TREE: FOREST :: (A) flower:plant (B) chair:room (C) cloth:fiber (D) voice:chorus (E) mistake:life

9. TRIGGER BULLET :: (A) handle:drawer (B) holster:gun (C) bulb:light (D) switch:current (E) pulley:rope

10. IMMUNITY:DISEASE :: (A) exemption:tax (B) pardon:transgression (C) debt:obligation (D) conformity:custom (E) adaptation:change

MATHEMATICS

Indicate the *one* correct answer among the five given after each question.

11. In North Dakota the temperature has gone as high as 114° and as low as -45° . How many degrees' difference is there between these two temperatures?

(A) 89 (B) 79 (C) 114 (D) 159 (E) 169

12. A school has 2, 3 or 4 classes each semester in physics, with 20 to 30 students in each class. If 10% of the physics students failed in one semester, what is the greatest number who could have failed?

(A) 3 (B) 6 (C) 8 (D) 10 (E) 12

13. A woman bought X yards and Y feet of ribbon at n cents per foot. How many cents did she pay?

(A) $n\left(\frac{X}{3} + Y\right)$ (B) $n(X + Y)$ (C) $n(3X + Y)$ (D) $n(X + 3Y)$ (E) $3n(X + Y)$

14. How many feet longer is the circumference of a circle 12 feet in diameter than the combined circumferences of two circles 8 feet and 4 feet in diameter?

(A) 0 (B) 2π (C) 4π (D) 6π (E) 8π

15. If $\frac{5}{4}X = 4$, $\frac{4}{5}X = (?)$

(A) $\frac{1}{4}$ (B) $\frac{64}{25}$ (C) 3 (D) $\frac{16}{5}$ (E) 5

16. If a man walks 1 mile north, then $1\frac{1}{2}$ miles west, and then 1 mile north, how many miles will he be from his starting point?

(A) $\frac{1}{2}$ (B) $\sqrt{13}$ (C) 2 (D) $\frac{5}{2}$ (E) $1 + \frac{1}{2}\sqrt{13}$

(Turn to page 262 for the answers.)

riculum is not likely to qualify a student for an engineering college. Nearly all engineering colleges require at least $3\frac{1}{2}$ years of high-school math, including algebra, plane geometry and trigonometry. Some require physics and chemistry as well. Most recommend them.

Leading high schools have guidance counselors who are familiar with the specific requirements of a great many colleges as well as with the individual abilities of the pupils in their schools. If possible, you should go to them for ad-

[Continued on page 256]

Atomic Battery Lasts For Years

MAN-MADE promethium, a radioactive fission product of nuclear reactors and an element nonexistent in nature, finds one of its first uses in a novel atomic battery. The tiny experimental model shown here, jointly developed by Elgin National Watch Co. and Walter Kidde Nuclear Laboratories, is designed for an electric wrist watch. Others are expected to power portable radios, hearing aids, and equipment in guided missiles and space craft.

First the battery yields light, which it then turns into electricity. Beta rays from promethium-147 oxide make cadmium sulfide, a light-emitting phosphor, glow. Silicon photocells transform the light into 20 microwatts of current, in the present model; larger ones will be more powerful. A $\frac{1}{16}$ -inch-thick case of Hevimet-alloy shielding confines the mild radioactivity and amply safeguards the wearer of a watch.

The Elgin-Kidde nuclear battery is said to be immune to heat, cold, and self-damage by radiation. Short-circuiting it does no harm, and power drawn from it doesn't run it down. Lasting as long as its promethium 147 (estimated half life, about 2½ years), it retains one-fourth of its original power for five years, which is considered its useful life. The promethium it uses, now costly, will become plentiful and inexpensive with quantity production this year.

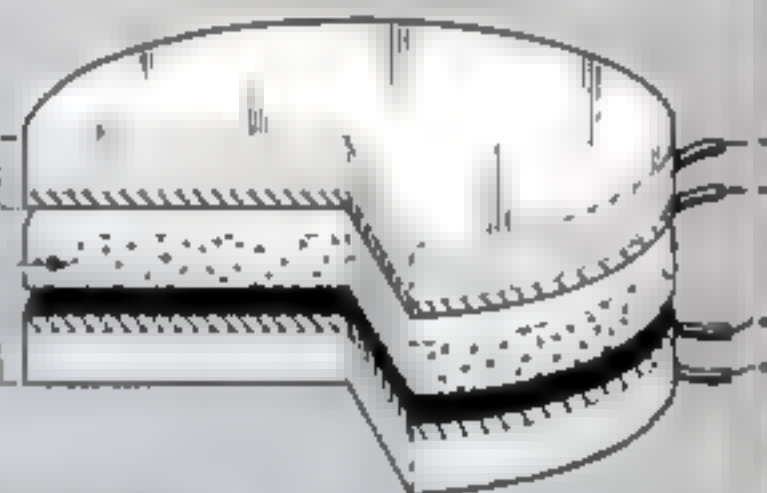
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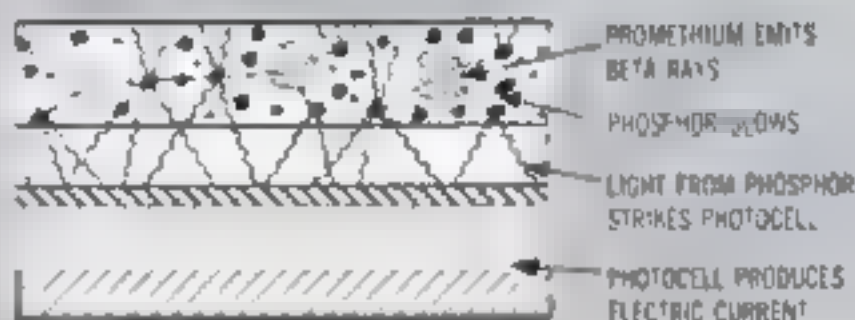
MIDGET TRANSMITTER with new atomic battery, and token range of a few feet, demonstrates nuclear-power radio.

What's inside the battery

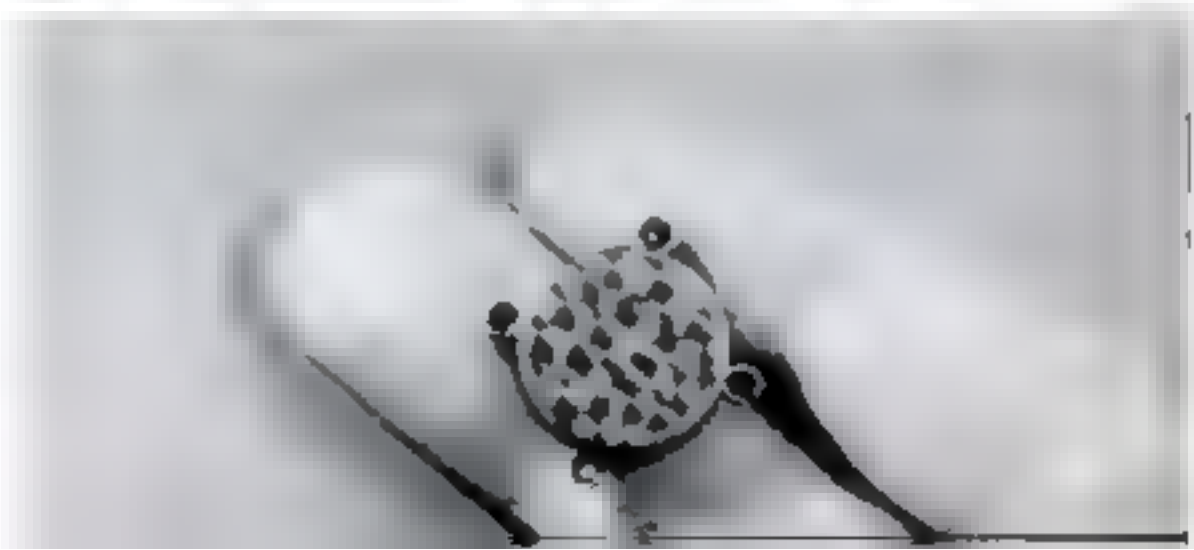
SILICON PHOTOCELL
RADIOACTIVE PROMETHIUM
AND PHOSPHOR
SILICON PHOTOCELL



How it works



SMALLER THAN DIME in diameter, battery below is for wrist watch. Its case holds the parts shown above.



Facts and Figures on

How do you choose a lawn mower? Price? Engine? Design? Here's

By Martin Mann

THE song of spring in the suburbs these days is the shrill soprano of the power lawn mower.

It's an even bet that you own a power mower now—half of all POPULAR SCIENCE readers do. You're probably going to buy a new one, too, before long—the life expectancy of a power mower, even if coddled, is around five or six years. This year nearly half of the 2,700,000 mowers expected to be sold will be replacements for old ones.

What kind should you get? Reel or rotary? Big or small? How much should you spend? Which make is best?

You'll find the facts here for a sound

decision. The charts on pages 100-101 list detailed specifications on representative mowers (not all mowers—there are nearly 300 brands).

Price. The range is wide, from about \$50 up, up, up. But this year you may get a break. The industry expects rough competition as more discount houses and department stores get into the business. That means price cutting. So the "suggested retail prices" given in our chart may turn out to be starting points for bargaining, like the "list prices" of cars.

The retailers who feature the prices that appear most alluring at first glance are not likely to handle the advertised makes listed in the PS chart. But some—not all—of the less familiar mowers are



Reel cuts like scissors



FAMILIAR HAND-MOWER MECHANISM snips grass on reel power mower too. Below is same mower, upright.

New Power Mowers

what you should know to pick the one for your grass-cutting job.

good ones. Check them for desirable points of design described below. Their engines are almost sure to be among the ones specified in our chart. (Be sure to check engine *model* as well as make.)

If you can wait until after the Fourth of July, you can take advantage of the end-of-season sales, which start about then. The prices will be better then, but the selection will be limited.

Which type? A few years ago you could liven up a Saturday-night party with a debate over the merits of the reel mower, which is basically a hand mower with an engine on it, compared to the rotary mower, which uses the engine to spin a scythe-like cutter. For the mass market, that argument is about over now:

Four of every five mowers sold are rotaries. The secrets of this quick success are simple:

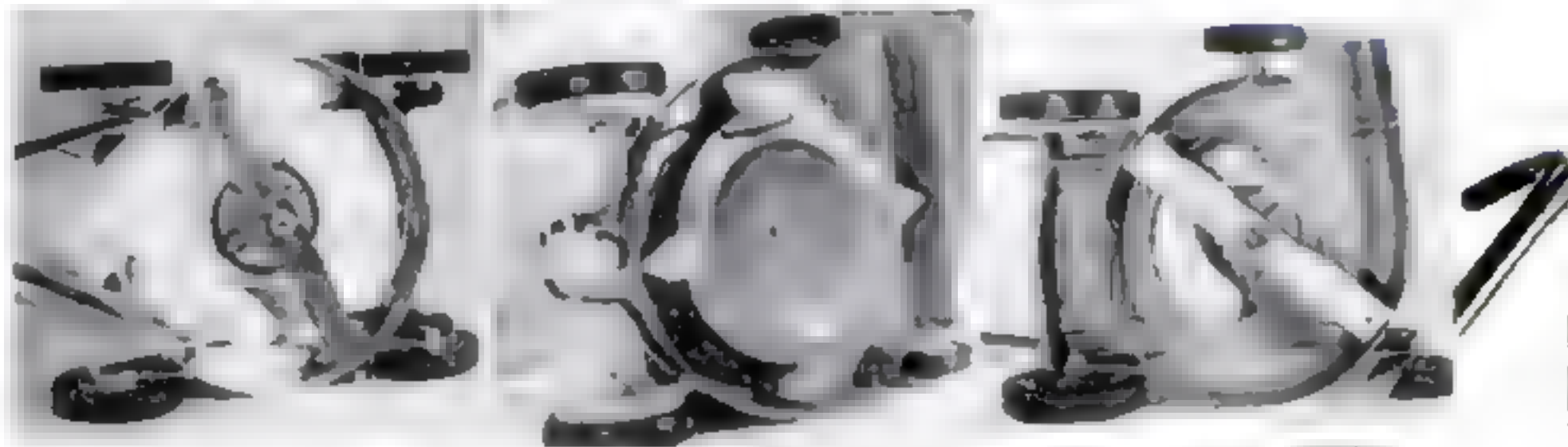
- **Low price.** A rotary runs \$10, more often \$20, less than an equivalent reel mower.

- **Trimming ability.** The rotary cuts outside its wheels and thus can get the grass along walks, under fences or next to the house. With a little practice you can mow close around a tree and leave no blade of grass uncut.

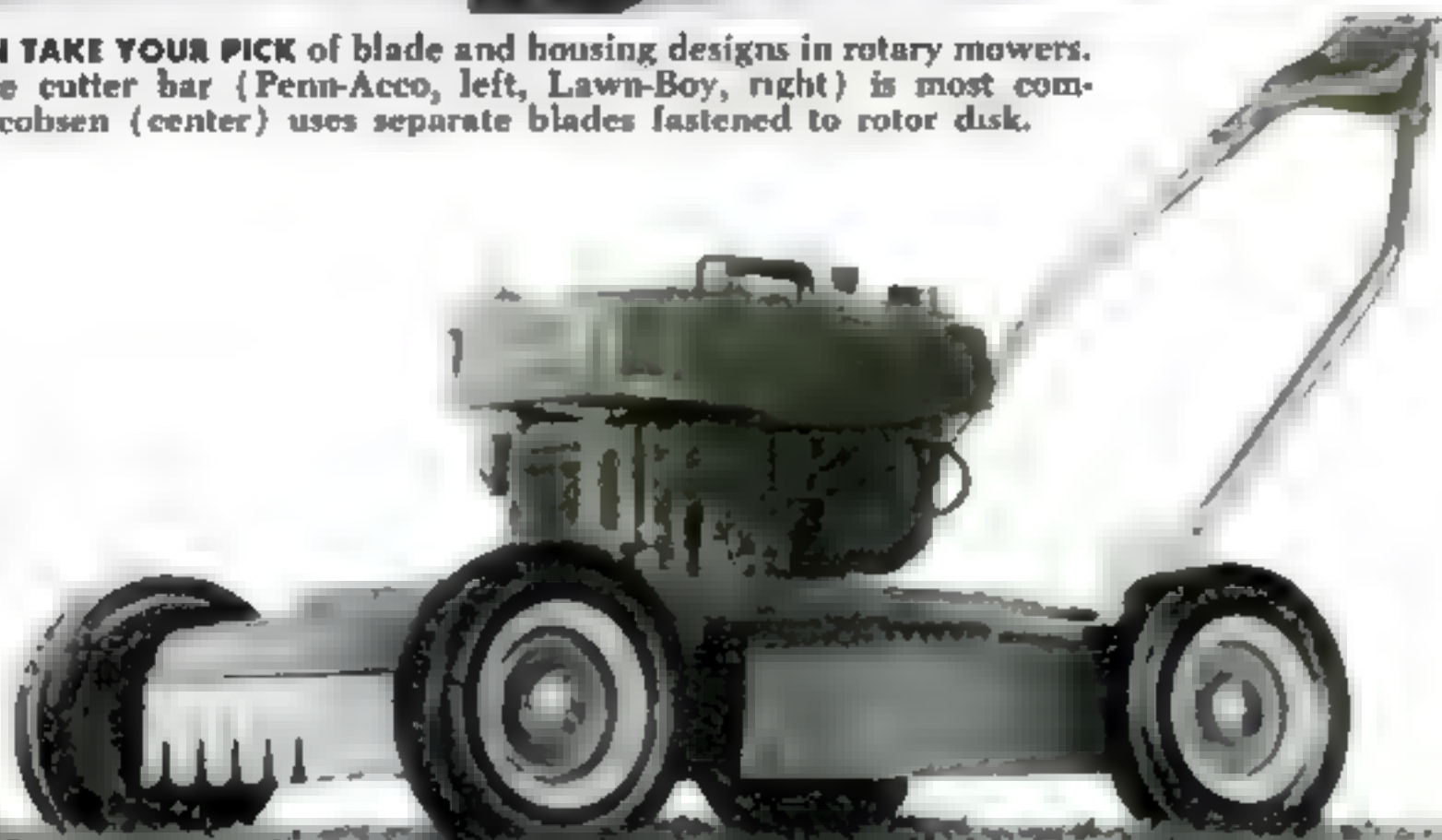
- **Versatility.** The rotary cuts just about anything. It tolerantly lets you goof off for a week, then slash two weeks' growth of thick grass at once. It chomps through tall weeds. Fitted

(Text continued on page 102)

Rotary type, now the most popular, cuts like a scythe



YOU CAN TAKE YOUR PICK of blade and housing designs in rotary mowers. One-piece cutter bar (Penn-Acco, left, Lawn-Boy, right) is most common. Jacobsen (center) uses separate blades fastened to rotor disk.



How They Compare:

ROTARY MOWERS

MAKE AND MODEL	PRICE	CUTTING WIDTH	WEIGHT (lb.)	ENGINE							
				Make and Model	Cycles	Horsepower at What R.P.M.	Torque (lb.-ft.) at What R.P.M.	Area of Mainshaft Bearings (sq. in.)	Air Cleaner	Muffler Size (cu. in.)	Starter
WESTERN AUTO Wizard 2X 2708	\$ 53	18"	42	Clinton VS 200	2	2.0 @ 3,800	2.8 @ 3,800	1.94	dry	3.4	rope
PENNSYLVANIA 64118 A	\$ 55	18"	40	Clinton VS 200	7	2.0 @ 3,800	2.8 @ 3,800	1.94	dry	4.5	rope
SEARS, ROEBUCK Craftsman S 205	\$ 55	18"	42	Power Products 601	2	1.9 @ 3,200	3.1 @ 3,400	a	dry	4	rope
DUO-TRIM MR-218-7	\$ 60	18"	42	Clinton VS 200	2	2.0 @ 3,800	2.8 @ 3,800	1.94	dry	4	rope
RED Rev-O-Trim	\$ 60	18"	35	Power Products V 47	2	1.9 @ 3,600	3.1 @ 3,400	a	dry	4	rope
SOLENS	\$ 65	18"	50	Power Products V 47	2	1.9 @ 3,600	3.1 @ 3,400	a	dry	4	rope
HUFF Y 7180	\$ 65	18"	46	Power Products 604	2	2.2 @ 3,200	3.1 @ 3,400	b	dry	30	rope
MONTGOMERY WARD Contender 832b	\$ 65	18"	46	Power Products 606	2	2.2 @ 3,200	3.1 @ 3,400	b	dry	30	rope
WESTERN AUTO Wizard 2X 709	\$ 68	18"	52	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	rope
GRASS QUEEN 2100A	\$ 70	18"	50	Clinton VS 200	2	2.0 @ 3,800	2.8 @ 3,800	1.94	dry	3.4	rope
JACOBSEN Model 50	\$ 70	18"	45	Jacobsen J-100-VB	2	1.8 @ 3,200	2.6 @ 3,000	c	dry	12.5	rope
LAWN BOY Economy 3100	\$ 70	18"	38	Lawn Boy C 20	2	1.85 @ 4,000	2.64 @ 2,800	2.68	dry	57	rope
SEARS, ROEBUCK Craftsman 88-1	\$ 70	18"	56	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
FORD White 100	\$ 70	18"	46	Power Products V 47	2	1.9 @ 3,600	3.1 @ 3,400	a	dry	4	rope
MONTGOMERY WARD Contender 871	\$ 75	18"	49	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
MONTGOMERY WARD 8123	\$ 75	18"	50	Power Products 604	2	2.2 @ 3,200	3.1 @ 3,400	b	dry	30	recoil
SEARS, ROEBUCK Craftsman 88-10	\$ 75	18"	59	Craftsman 143 V20A 1111WA	4	2.0 @ 3,600	3.05 @ 3,200	1.98	oil	8	recoil
WESTERN AUTO Wizard 2X 2715	\$ 75	18"	52	Clinton VS 2100	4	2.0 @ 3,600	2.9 @ 3,600	1.70	dry	6.8	recoil
WESTERN AUTO Wizard 2X 2717	\$ 80	18"	53	Clinton VS 2100	4	2.0 @ 3,600	2.9 @ 3,600	1.70	dry	6.8	recoil
EXCELLO 1187	\$ 85	18"	55	Austin V 7	4	1.70 @ 3,200	2.8 @ 3,200	1.98	dry	6.6	rope
LAWN BOY Decade 3000	\$ 85	18"	4	Lawn Boy C 12	2	2.0 @ 4,000	2.64 @ 2,800	2.68	dry	57	recoil
STAMPED	\$ 86	18"	50	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	rope
BOLENE	\$ 88	18"	45	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
EVERSHAMP 2A	\$ 90	18"	56	Briggs & Stratton 68-HS	4	2.25 @ 3,600	3.29 @ 3,600	1.78	oil	6	recoil
GRASS QUEEN 167	\$ 90	19"	56	Clinton VS 2100	4	2.0 @ 3,600	2.9 @ 3,600	1.70	dry	6.8	recoil
MONTGOMERY WARD Wardmax 8810	\$ 90	19"	63	Briggs & Stratton 68-HS	4	2.25 @ 3,600	3.29 @ 3,600	1.78	oil	6	recoil
MOTO-MOWER Deluxe	\$ 90	18"	43	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
PENNSYLVANIA Penn Acce 64118 A	\$ 93	18"	41	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	15.7	rope
EXCELLO 1188	\$ 95	18"	67	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
LAWN-BOY Decade 3000	\$ 95	18"	43	Lawn Boy C 12	2	2.0 @ 4,000	2.64 @ 2,800	2.68	dry	57	recoil
FORD White 100	\$ 95	18"	47	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	22	recoil
YAZOO Super 3	\$ 95	18"	65	Clinton VS 2100	4	2.0 @ 3,600	2.9 @ 3,600	1.70	dry	6.8	recoil
HUFF 4 RS	\$ 98	18"	55	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
SAVAGE Rotor Chief 18	\$ 98	18"	52	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
CLEMSON R 470	\$ 98	18"	46	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	15.7	recoil
COOPER Koppel 18	\$ 98	18"	46	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	6	recoil
JACOBSEN Model 54B	\$ 100	18"	52	Jacobsen J-100-VS	2	2.0 @ 3,000	3.1 @ 3,000	c	dry	35	recoil
MOTO-MOWER Calmar	\$ 100	18"	50	Briggs & Stratton 68-HS	4	1.75 @ 3,200	2.85 @ 3,200	1.78	oil	5.7	recoil
EDLIFE Duo-Master 19	\$ 100	19"	53	Briggs & Stratton 68-HS	4	2.25 @ 3,600	3.29 @ 3,600	1.78	oil	6	recoil
HUFFY 4187	\$105	18"	56	Briggs & Stratton 68-HS	4	2.25 @ 3,600	3.29 @ 3,600	1.78	oil	6	recoil
DUO-TRIM MR-418-7	\$105	18"	45	Clinton VS 2100	4	2.0 @ 3,600	2.9 @ 3,600	1.70	dry	6.8	recoil
RED Spin-Trim	\$110	18"	72	Red 5230-7	4	2.25 @ 3,800	3.3 @ 3,800	2.48	dry	18	recoil
ECLIPSE Duo-Master 21"	\$ 115	21"	54	Briggs & Stratton 68-HS	4	2.75 @ 3,600	4.02 @ 3,600	1.78	oil	6	recoil
YAZOO Master	\$ 115	20"	113	Clinton VS 900	4	2.75 @ 3,600	4.0 @ 3,600	2.27	dry	8.3	recoil

NOTES: a. This information not specified by the manufacturer. * Shaft has one needle, one bronze and one steady-rest bearing.

† Shaft has two needle bearings and one steady-rest bearing. † Shaft has two ball bearings and one needle bearing. † Housing is heavier at points of stress.

‡ Mower may come with either Clinton VS 2100 or Briggs & Stratton 68-HS engine.

REEL MOWERS

MAKE AND MODEL	PRICE	CUTTING WIDTH	WEIGHT (lb.)	ENGINE							
				Make and Model	Cycles	Horsepower at What R.P.M.	Torque (lb.-ft.) at What R.P.M.	Area of Mainshaft Bearings (sq. in.)	Air Cleaner	Muffler Size (cu. in.)	Starter
SEARS, ROEBUCK Dunlap 8147	\$ 70	18"	52	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
WESTERN AUTO Wizard 2X 2707	\$ 88	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
MONTGOMERY WARD Contender 8123	\$ 90	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
MOTO-MOWER Warden	\$ 90	20"	55	Briggs & Stratton 68-S	4	2.0 @ 3,200	2.85 @ 3,200	1.57	oil	6	
GRASS QUEEN 20	\$ 90	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
RED 5240-7	\$ 90	18"	72	Red 5240-7	4	2.25 @ 3,800	3.3 @ 3,800	1.78	dry	4.5	
CLEMSON Power Drive, Jr.	\$110	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	15.7	
MONTGOMERY WARD Wardmaster 8114	\$110	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
MOTO-MOWER Highlander	\$110	18"	55	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
EXCELLO 2188	\$115	18"	67	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
PENNSYLVANIA Explorer 8	\$115	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	15.7	
SEARS, ROEBUCK Craftsman 8154	\$115	18"	52	Briggs & Stratton 68-SF	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
SOLENS	\$ 70	18"	50	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
ECLIPSE 2188	\$120	18"	52	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
EVERSHAMP 50	\$120	18"	56	Briggs & Stratton 68-S	4	1.5 @ 3,200	2.85 @ 3,200	1.20	oil	6	
JACOBSEN Pacer	\$120	18"	45	Jacobsen J-100-AS	2	1.8 @ 3,000	2.6 @ 3,000	a	oil	35	
SAVAGE Power Chief	\$120	18"	52	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
COOPER Koppel ACA	\$125	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
SEARS, ROEBUCK Craftsman 8154	\$125	18"	52	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
MOTO-MOWER Sun Valley	\$135	18"	55	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	15.7	
DUO-TRIM 18 SPL 418	\$140	18"	45	Clinton A2 100	4	2.0 @ 3,600	2.9 @ 3,600	1.32	oil	4.5	
ECLIPSE Rocket	\$140	20"	54	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
RED Royale 18	\$140	18"	72	Red 5240-7	4	2.25 @ 3,800	3.3 @ 3,800	1.78	dry	17.7	
FORD Sport Lawn 20"	\$140	20"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	15.7	
CLEMSON Power Drive	\$150	18"	46	Briggs & Stratton 68-S	4	1.75 @ 3,200	2.85 @ 3,200	1.20	oil	6	
JACOBSEN Lawn Queen	\$155	21"	45	Jacobsen J-100-B	2	1.8 @ 3,200	2.6 @ 3,000	a	oil	35	

NOTES: a. This information not specified by manufacturer. † Jacobsen engine shafts have two ball bearings, for which area cannot be specified.

CUTTER						BODY				
Type of Cutter	How Close To Wall Mower Can Trim		Height of Cut		Leaf Mulcher	Housing Material	Wheel Diameter		Wheel Material	Wheel Bearing
	Front	Side	Lowest	Highest			Front	Rear		
edged bar	3 4"	5 8"	1 1 2"	2 1 2"	standard	14 ga steel	5"	6"	plastic	nylon
edged bar	1 1 2"	1 2"	1"	3"	n.s.	10 ga steel	7"	7"	plastic	nylon
edged bar	1 2"	n.s.	1"	2 7 8"	optional	1 5" aluminum	6 1 4"	6 1 4"	plastic	none
edged bar	n.s.	3 8"	7 8"	2 7 8"	optional	14 ga steel	6"	6"	steel	powdered metal
edged bar	n.s.	3 8"	7 8"	2 7 8"	optional	14 ga steel	6"	6"	steel	powdered metal
edged bar	3 8"	3 8"	1 8"	2"	standard	14 ga steel	6"	6"	plastic	nylon
edged bar	3"	1 2"	1"	3"	optional	14 ga steel	7"	7"	steel	powdered metal
edged bar	1 3 8"	1 2"	1 1 4"	3"	standard	14 ga steel	5"	7"	steel	powdered metal
edged bar	3 4"	5 8"	1 1 2"	2 1 2"	standard	14 ga steel	6"	6"	plastic	nylon
reversible bar	5 8"	1 2"	7 8"	2 7 8"	standard	14 ga steel	6"	6"	plastic	nylon
rotor, 2 blades	7"	3 8"	1"	3"	none	14 ga steel	6"	6"	steel	ball
edged bar	3 4"	3 8"	1"	2 1 2"	optional	1 5" aluminum	6"	6"	plastic	nylon
bar and blades	1 2"	3 8"	3 4"	3"	optional	14 ga steel	6 1 4"	6 1 4"	steel	powdered metal
edged bar	1 2"	1 2"	1 1 16"	2 3 8"	standard	12 and 14 ga steel	6"	6"	steel	powdered metal
edged bar	1 3 8"	1 2"	1 1 4"	3"	standard	14 ga steel	5"	7"	steel	powdered metal
edged bar	1 1 2"	1 2"	1 1 4"	3"	standard	1 5" aluminum	6"	6"	zinc	powdered metal
bar and blades	1 2"	3 8"	3 4"	3"	included	14 ga steel	7"	7"	steel	powdered metal
edged bar	3 4"	5 8"	1 1 2"	2 1 2"	standard	14 ga steel	6"	6"	steel	nylon
edged bar	3 4"	5 8"	1 3 16"	2"	standard	1 5" aluminum	7"	6"	steel	nylon
edged bar	1 2"	1 2"	1"	3 1 4"	optional	3 16" aluminum	6"	8"	steel	nylon
edged bar	3 8"	3 8"	1"	2 1 2"	optional	1 5" aluminum	6"	6"	plastic	nylon
bar and blades	2 3 4"	9 16"	1"	3"	optional	14 ga steel	7"		steel	ball
edged bar	3 8"	3 8"	1 8"	2"	standard	14 ga steel	6"	6"	plastic	nylon
reversible bar	1 2"	1 4"	7 8"	2 7 8"	standard	1 16" aluminum	6"	7"	steel	nylon
reversible bar	2"	1 4"	7 8"	2 7 8"	standard	1 16" aluminum	6"	6"	plastic	nylon
edged bar	1 1 2"	1 2"	1 1 4"	3"	standard	1 8" aluminum	6"	9"	zinc	powdered metal
edged bar	3 8"	3 8"	1"	3"	optional	5" aluminum	6"	8"	steel	powdered metal
edged bar	1 1 2"	1 2"	1 1 2"	1 1 2"	standard	1 8" aluminum	7"	7"	plastic	nylon
edged bar	1 2"	1 2"	1"	3 1 4"	optional	3 16" aluminum	8"	8"	steel	nylon
edged bar	3 8"	3 8"	1"	2 1 2"	optional	1 8" aluminum	6"	8"	plastic	nylon
edged bar	3 8"	3 8"	2"	3"	standard	5 32" aluminum	6"	8"	steel	powdered metal
edged bar	2"	1 2"	1 2"	3"	standard	14 ga steel	6"	8"	steel	nylon
edged bar	3"	1 2"	1"	3"	optional	14 ga steel	7"	7"	steel	powdered iron
edged bar	1 2"	1 2"	1"	2 3 4"	standard	14 ga steel	6"	8"	steel	powdered metal
reinforced bar	5 8"	5 8"	1"	3"	standard	1 8" aluminum	6"	6"	plastic	nylon
edged bar	3"	0"	1 1 2"	3"	optional	3 8" aluminum	6"	6"	steel	ball
rotor, 4 blades	1 1 2"	1 2"	3 4"	2 3 4"	standard	1 10" aluminum	6"	8"	steel	ball
edged bar	3 8"	3 8"	1"	3"	optional	1 8" aluminum	6"	6"	steel	powdered metal
edged bar	1 3 4"	1 2"	1"	3"	optional	14 ga steel	6"	8"	steel	ball
edged bar	3"	1 2"	1"	3"	optional	14 ga steel	7"	7"	steel	powdered iron
edged bar	n.s.	3 8"	1"	3"	standard	14 ga steel	7 1 2"	7 1 2"	steel	ball
edged bar	n.s.	3 8"	1"	3"	standard	14 ga steel	8"	6"	steel	ball
edged bar	2 3 8"	3 4"	1"	3 1 4"	optional	3 16" aluminum	8"	8"	steel	ball
edged bar	1 2"	1 2"	1 2"	3 1 2"	optional	16 ga steel	6"	16"	steel	ball

CUTTER					PROPELLING MECHANISM				
Starter	Roll Shaft Bearing	Drive to Roll	Height of Cut		Drive to Wheels	Clutch	Wheel Bearing	Ground Speed (m.p.h.)	
			Lowest	Highest				Slowest	Fastest
rope	ball	open belt	5 8"	2"	open chain	ball tightener	bronze	1 1 4	3
rope	roller	open chain	1 2"	3"	open belt	spring pulley	roller	3	4
recoil	ball	open chain	3 8"	1 7 8"	open belt & chain	ball tightener	steel	1 1 2	3
rope	ball	enc. chain	3 4"	1 1 2"	enc. belt & chain	ball tightener	cast iron	1 4	3
recoil	ball	partly enc. chain	5 8"	1 3 4"	partly enc. chain	auto centrifugal	none	1 4	3
rope	ball	enc. chain	3 4"	2"	partly enc. belt & chain	ball tightener	roller	2	3 7
recoil	ball	enc. used gears	7 16"	2"	enclosed gears	friction	roller	1 4	3
recoil	ball	open chain	7 8"	1 7 8"	open belt & chain	centrifugal	sleeve	1 1 2	3
rope	ball	enc. chain	3 4"	1 1 2"	enc. belt & chain	ball tightener	cast iron	1 4	3
recoil	roller	enc. chain	3 4"	1 3 4"	enc. used belt	ball tightener	bronze	n.s.	n.s.
rope	roller	open chain	3 4"	2"	open chain	ball tightener	none	1 1 2	4
recoil	ball	open belt	5 8"	1 5 8"	open belt	ball tightener	roller	2	5
recoil	ball	enc. chain	3 2"	2"	enc. used chain	ball tightener	ball	n.s.	n.s.
recoil	ball	open chain	1 2"	1 1 2"	open chain	ball tightener	none	1	3
recoil	roller	partly enc. chain	5 8"	1 3 4"	partly enc. chain	auto centrifugal	roller	1 4	3
recoil	ball	enc. chain	1 2"	2 1 4"	enc. belt & chain	ball tightener	roller	1 7	3 4
recoil	roller	enc. belt	7 8"	1 7 8"	open chain & gear	ball tightener	roller	1	3
recoil	roller	enc. chain	1 2"	2 5 8"	enc. belt & chain	ball tightener	roller	1	4
recoil	ball	enc. chain	3 8"	1 1 2"	enc. used chain	auto disk type	roller	1 1	3 7
recoil	roller	enc. chain	15 16"	2 3 16"	enc. belt & chain	ball tightener	cast iron	1 4	3
recoil	ball	enc. chain	3 4"	2"	partly enc. belt & chain	ball tightener	roller	2 1 4	4
recoil	roller	enc. chain	3 4"	1 1 2"	partly enc. chain	expanding shoe	none	1	3
recoil	ball	enc. chain	3 4"	2"	enc. belt & chain	ball tightener	roller	2	3 7
recoil	ball	enc. chain	1 4"	2 1 2"	enc. belt & chain	split pulley	bronze	1 2	3 9
recoil	ball	enclosed gears	7 16"	2"	enclosed gears	friction & jaw	roller	1 4	3
recoil	roller	enc. chain	5 8"	2"	enc. belt & chain	auto disk type	roller	1 7	3 3

Most homeowners prefer the versatile rotary—but

with a mulching attachment, it grinds up leaves so you don't have to rake them. Even without the attachment, it more or less disposes of last year's corn stalks and tomato vines (also small toys, sticks, and hot dogs from bygone barbecues).

Don't think the power reel mower is obsolete, though. It's still the favorite among estate gardeners and greenkeepers. If you have ploughed real money into a fine lawn and want that golf-green look, you'll prefer the reel type. Its advantages are:

- **Smooth cut.** The reel shears off grass cleanly and evenly. A rotary can, too, but only if it is perfectly adjusted.

- **Power drive.** All power reel mowers are self-propelled, while only the more expensive rotaries (priced from \$100 on up) are.

What size? Well, what size is your yard? A big mower saves work only if you have a large, unbroken expanse of lawn. For a small yard, or even a large one containing flower beds, trees and shrubs, a small mower is better because it is easier to maneuver.

Most people find the 18-inch job adequate. Mowers of approximately this size account for half of all sales (and are the ones listed in our spec chart).

One caution on size, though. Some overzealous promoters of inexpensive rotary mowers advertise the outside diameter of the blade housing and call that the "size." The true size, which is the width of the swath cut, will be an inch less. If you're in doubt, measure the blade.

Which engine? The one thing that every know-it-all expounds about power mowers is that there are two types of

engines, two-cycle and four-cycle, and that the two-cycle engine is inferior and hard to start. *This is just plain not so.* A good two-cycle engine performs as well and starts as easily as a good four-cycle engine.

The obvious differences between the two types roughly cancel out. The two-

cycle is simpler (three moving parts) and sometimes cheaper. The four-cycle has the appurtenances of auto engines—camshaft, pushrod, etc.—which cost money. The two-cycle requires gas mixed with oil (though you then *do* know that it has oil). The four-cycle burns regular gas, like a car; but then you have to remember to keep the crankcase filled with oil (a messy job, too). Both types make too much noise unless

fitted with good mufflers—the unmuffled two-cycle just screams at an annoyingly higher pitch. The two-cycle smokes when it gets out of adjustment, but the four-cycle may do that, too.

So you should look, not for one type or the other, but simply for a good engine suited to the mower it operates. The standards you apply to auto engines apply equally well here. For instance:

- **Power output.** The bigger the blade the more horsepower and torque you need. Allow extra power for a rotary to be used often on heavy weeds. Also allow extra for a self-propelled rotary.

- **Bearings.** The money that the manufacturer puts in here pays off in longer engine life. Rotaries need huskier bearings on the main shaft to take the shock that comes when the blade hits a rock. Most one-lung engines have two, plain, solid bearings, which are rated by their effective bearing area. Power Prod-

Watch Your Toes!

No power mower is safe, but the rotary mower has a particular taste for toes—on slopes it wants to roll back over your feet. Dr. William L. White of the University of Pittsburgh checked 19 hospitals around Pittsburgh last year and found that they had treated 89 people injured by rotaries. The accidents broke down so:

- Toes and feet—48 cases;
- Fingers and hands—36 cases;
- Legs—five cases (three struck by blade fragments, one hit by a stone, one clobbered by an overturned mower).

Dr. White estimates that, nationwide, at least 10,000 similar accidents occurred last summer.

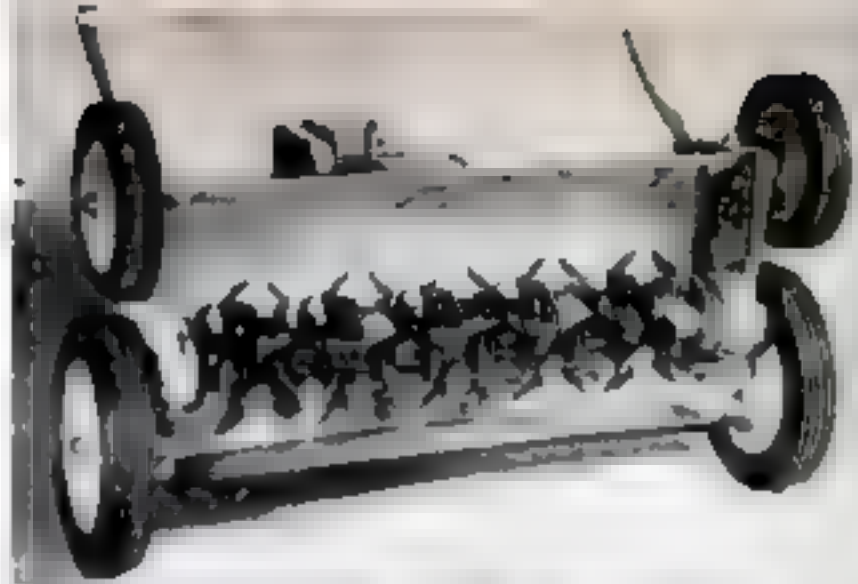
a reel may cut smoother

ucts uses needle bearings; Jacobsen uses needle and ball bearings. For these, area cannot be specified. The same general rule applies to all bearings, though: the more bearings and the bigger they are, the better.

- **Air cleaner.** Dirt in the carburetor is the most common cause of trouble with mower engines. So the air cleaner is important. The oil-bath type is considered somewhat more effective, though not used on many rotary mowers. Reason: You have to tip rotaries to clean grass clippings out of the housing and the oil may spill.

- **Muffler.** Some power mowers sound like a B-52 on takeoff. The engine exhaust makes the most but not the only noise—blades (especially rotary ones) scream; housings rattle; transmission parts clank. Still, a good muffler helps a lot. The best clue to silencing ability is size, the number of cubic inches exhaust gases have to expand in. The small mufflers on many engines are little more than the open ends of the exhaust pipes. A few quality mowers have whopping big ones, such as the 57-cubic-inch muffler that Lawn-Boy uses. An under-the-housing exhaust, incidentally, is favored by some experts, who say that the housing itself acts as a silencer.

- **Starter.** A recoil starter, which automatically rewinds the cord after each pull, is strictly a convenience but adds only a few bucks to the cost of a mower. It's nice, too, if the rewind unit is easy to detach, as it is on some Sears mowers. Then you can use an ordinary rope when the rewind cord breaks—you can be



CROSS BETWEEN ROTARY AND REEL TYPES, the new "hammer-knife" mowers have rotary-like blades spinning on reel-like horizontal shafts. They can cut weeds and mulch leaves, are said to be safer than rotaries. Contour (upper photo) and Mott models are also pictured on PS cover.

sure it will break on a Saturday afternoon after the service shop has closed.

Cutter. Here's the part of the machine that does the job at hand, moving the grass. It varies from make to make in small details that can be significant.

The reel cutter is standardized more than the rotary type. It scissors grass between rotating spiral blades and a stationary bed knife. The more spiral blades there are, the closer the cuts come and the finer the result. Small mowers usually have reels with five blades; the Toro Sportlawn has six blades; and some makes can be ordered with seven.

[Continued on page 264]

There's a dream mower in the future of your lawn

A radically new kind of grass-cutting machine is predicted by one expert, whose firm sells more mowers than any other. His crystal ball reveals these improvements for the future:

- Much smaller, lighter engines that run at higher speeds
- Automobile-type electrical systems—storage battery, generator, self-starter, standard ignition (no magneto)
- Fuel injection, to replace carburetors

- Fluid drives—and eventually full hydraulic power, with the engine driving a pump and individual hydraulic motors turning each wheel. Such a mower could turn around in a space equal to its own wheelbase

You can already see the start of the trend to a new kind of mowing machine in the riding mowers, designed from the ground up for easy grass cutting. For a special report on mowers built for riding, please turn the page.



LOW SLUNG, the tricycle-type Toro Pony (left) keeps a secure footing even on grades. A 2.75-hp. engine drives a 27-inch reel independently of the wheels—you can disengage the cutter to ride over gravel. An extra friction clutch reverses the wheels for tight maneuvering.

TWIN-ENGINE JOB (below) has a three-hp. one-lunger (between the lady's legs) to spin the 30-inch blade; another 2½-horse unit (under seat) to drive the rear wheel. Bready Champion also offers gear transmission (two speeds forward, one reverse), foot brake, foot clutch and hand throttle.



TWIN BLADES cut 24-inch swath under streamlined Mow-Cycle (left). It has a three-hp. Clinton engine powering the two close-set rear wheels through a belt-to-gear-to-chain drive train. Seat of steel screening molded into a cushion is said to provide a cool, comfortable ride.

Hop Aboard and Mow Your Lawn

YOU'LL see more and more of a newly evolving breed of power mowers this spring: a machine basically designed to cut grass while you sit on top. The seat is no afterthought, to be attached if you want it, but an integral part of the mower. Some of these machines do nothing but mow the lawn, but most



LIKE A CAR, Porter-Cable's Mark XXVI (above) has front engine, standard geared differential. Two blades cut 26-inch swath, can be stopped quickly by special brake. There is a drawbar hitch at rear for towing some attachments, and dozer blade can be put on front.



CLOSE-TRIMMING REEL CUTTER—the wheels are out of the way behind the cutter—is used on Reo's 25-inch Ride-A-Lawn (above). A lever lifts the cutter off the ground and disengages it to let you drive across walks and driveway. Other attachments can replace the cutter.



ROTARY CUTTER FLOATS on its rear mounts so that it can tilt with front wheels to follow contours of the ground. Cutting unit comes off the machine when other attachments are to be used. Under the hood of the Simplicity Wonder-Boy is an L-head engine delivering 3.6 hp.

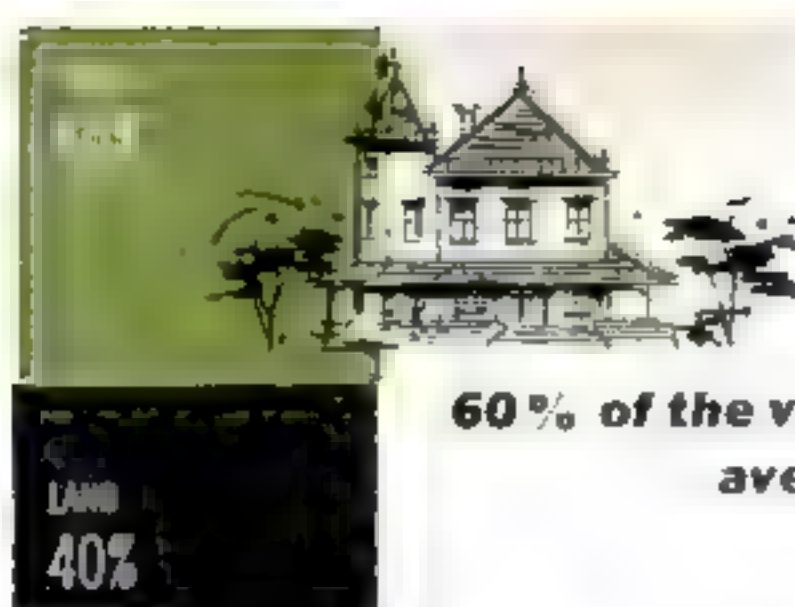
take attachments for other yard jobs.

Six of the many models now on the market are shown above. Most makers lean toward a machine resembling a small car: four wheels, automotive-type steering (though the handle is usually a tiller or bicycle bar), big rotary cutter swinging between the wheels. The

mowers that use reel-type cutters look more like scooters.

In general, the riding mowers tend to big size (swath of 24" or more) and big price (from around \$200, way up). Yet many mow small lawns—an affluent suburbanite won't walk behind a mower if he can ride on top of one. **END**

In 1890 . . .



Your House Is Now

A new study reveals that the value of your home depends mostly on the building and improvements, not on the land.

By Dexter M. Keezer

Director, Dept. of Economics, McGraw-Hill Pub. Co., Inc.

and William H. Chartener

Economist, McGraw-Hill

THE statistical drawings above tell a story that is important for all Americans, and a story that is particularly important for those millions in cities and suburbs who own their homes or who may own them before long.

They are based on figures presented in a new book, *Capital Formation in Residential Real Estate*, written by Leo Grebler, David M. Blank and Louis Winnick and published by the Princeton University Press for the National Bureau of Economic Research. What the drawings say that is so significant to present and potential urban and suburban homeowners is this: *The land part of your investment in a home is now of minor and steadily decreasing importance. It is what goes into the house in labor, materials, equipment and care that largely determines the value of your investment.*

As the significance of these facts sinks in, the business of owning a home emerges in a new light—as an investment over which the owner has an increasing measure of control, and an investment that is also likely to be cashed in.

Add to this the fact that for most Americans their home is the largest single investment they will ever make, and

it conclusively demonstrates the importance of giving their home full respect as an investment as well as a place in which to live.

When the fact that the value of the land is a minor and declining part of the investment in a home is added to a few other key facts about home owning, the significance of home ownership tends to emerge in a new light.

One of the key facts involved is that the federal government makes it easy—some people think much too easy—to become a homeowner and to increase the value of your property through improvements and alterations.

Another key fact is that Americans have become such a tribe of 20th-century nomads that there is a steadily mounting chance that those owning homes will sell them, and buy others, rather than die in their present homes.

THE upshot of all this is that you are now largely the master of your fate as homeowner. How you get set up in your house, and fix it up, is by far the controlling element in your investment. And the chance that you will want to cash in on the investment rather than hold it increases all the time.

This was not always the case. So long as the cost of land was a major part of the investment in a house, what the



**Now . . . the house and improvements
amount to 84%
of the average home's value**

LAND 16%

Your Savings Account

owner could do to improve and protect his investment was limited. In fact, the number of people who crowded in around the house in metropolitan masses, and thus boosted the value of the land, tended to have about as much effect in determining the value of the house as anything the owner could do about the structure.

HENRY GEORGE capitalized on this fact toward the end of the last century to touch off one of the liveliest economic crusades in our national history. He argued that the owners of the land didn't need to do anything to get rich except sit around and wait for people to crowd in and increase its value by making land scarcer and scarcer. He maintained that if the government took all this "unearned increment" in the value of land in taxes, it would need only this "single tax" to pay all its bills. Primarily on this platform, Henry George ran for mayor of New York City in 1886. And he and a lot of other people thought he actually got enough votes to win but was counted out by crooked election tellers.

But since Henry George cut his wide political swath in the U.S., the part of the investment in a home represented

by the value of the land—and hence the "unearned increment"—has declined strikingly. Indeed, the authors who dug up the figures on which the drawings for this article are based say they actually understate how much the value of land as a part of the total investment has declined. This is because the only figures they could get for land value include a lot of expenses in fixing up the "raw" land to accommodate a house—such as grading, landscaping and paving.

Most of the explanation for this change is found, of course, in the development of modern transportation, particularly automobile transportation. Primarily because of the automobile, what yesterday was a potato field far from the city's center becomes a housing development today.

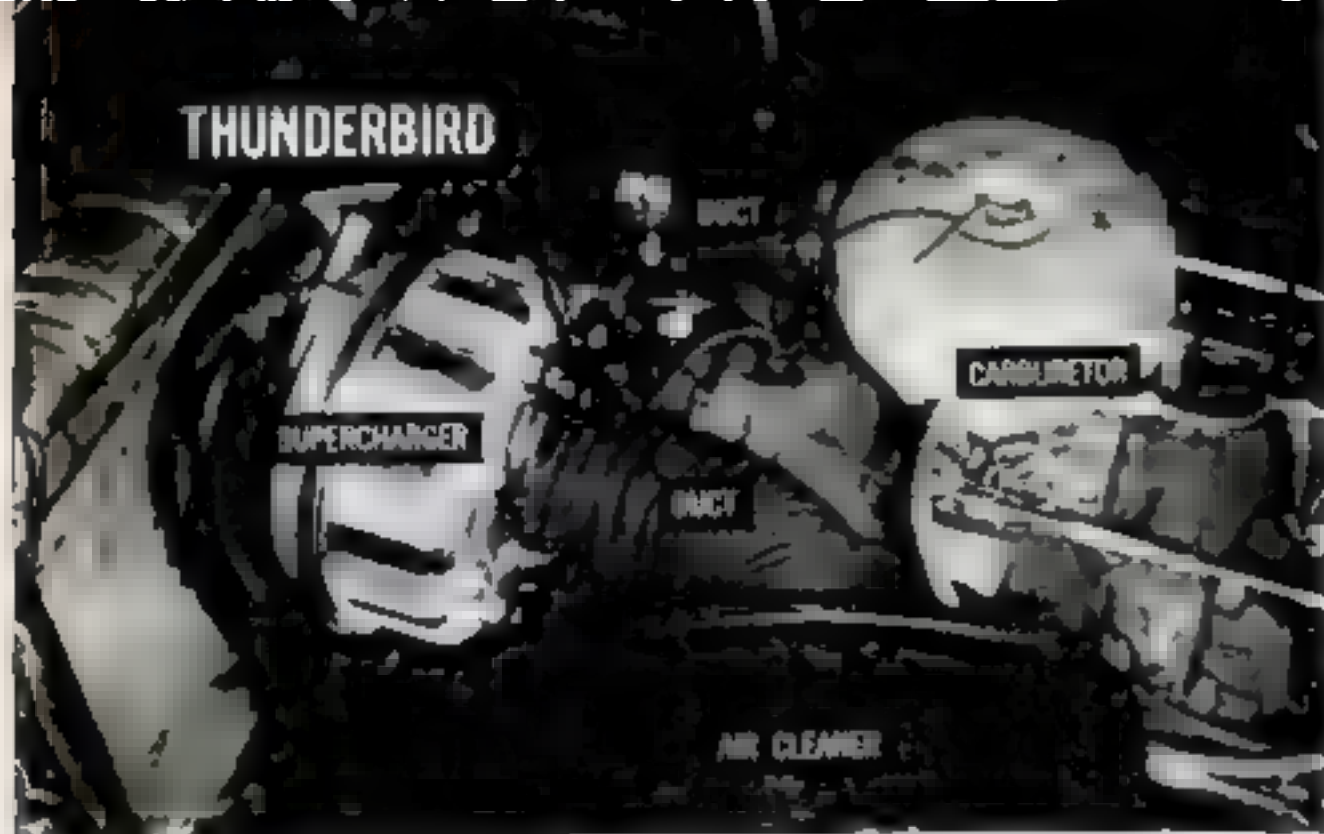
The tightly packed city residential area gives way to suburbia and exurbia. And with the relieving of pressure on scarce city and nearby suburban land, the share of land value in the total value of the home has gone down.

This has meant that the part of the investment in a home over which the owner has some positive control—the part represented by the structure—has increased. At the same time, so has the

[Continued on page 254]

Number of Home-Owning Families Goes Up and Up

THREE out of five American families now own their homes, according to a check recently made by the U. S. Bureau of the Census. As recently as 1940 it was only two out of five families. Not counting those living on farms, about 26 million families own their homes, and the number keeps going up every year.



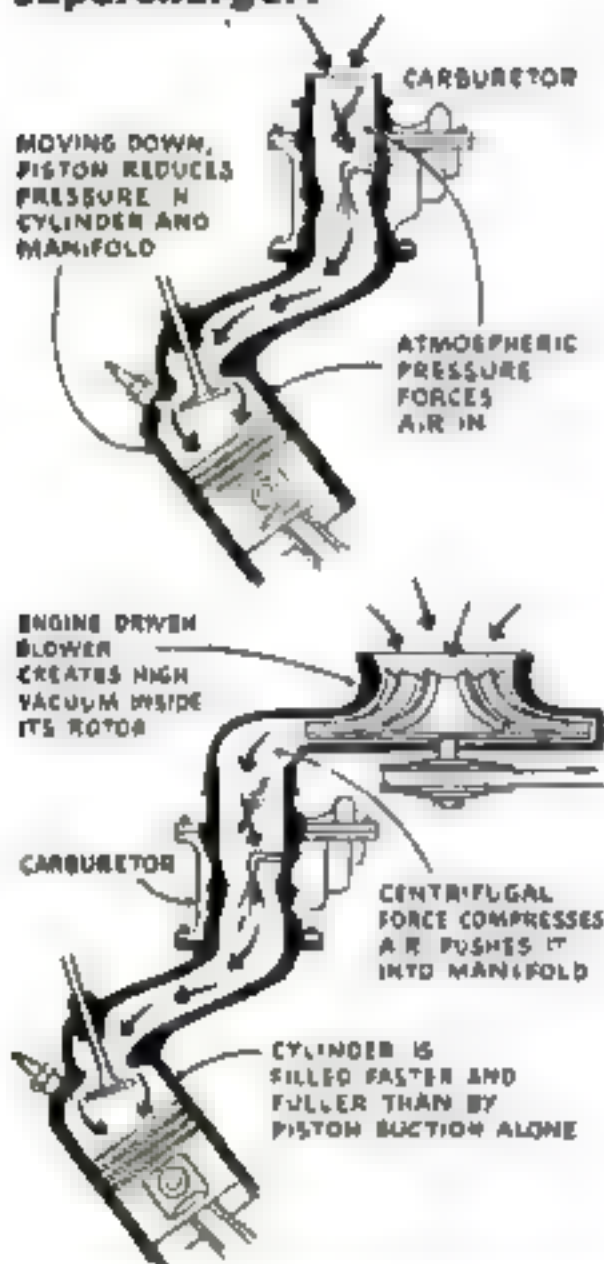
IN A DAYTONA T-BIRD, Ford's modification of the McCulloch blower looked like this. It eliminates the two-speed feature in favor of a fixed-diameter pulley on the supercharger shaft. Dome-covered carburetor is a modified four-barrel Lincoln job. Intake manifold has larger-than-standard passages for fuel-air mix.

Superchargers Spur

Factory-installed blowers are breathing new vigor into power plants of four 1957 cars. It's a counter to fuel injection.

By James C. Jones

What is a supercharger?



DIFFERENCE between conventional and supercharged engines is shown here: The first sucks in its fuel-air mix; the supercharged forces it in by a blower.

A SUPERCHARGER is the auto industry's latest whip to beat more horses out of already highly bred engines. You can now have a "blower" as standard equipment on the 1957 Studebaker Golden Hawk and Packard Clipper. Or Ford will install one as an option on their 312-cubic-inch V-8 and on the Thunderbird.

Whether Studebaker-Packard and Ford are front-runners in a trend or simply grasping at competitive straws depends on two things:

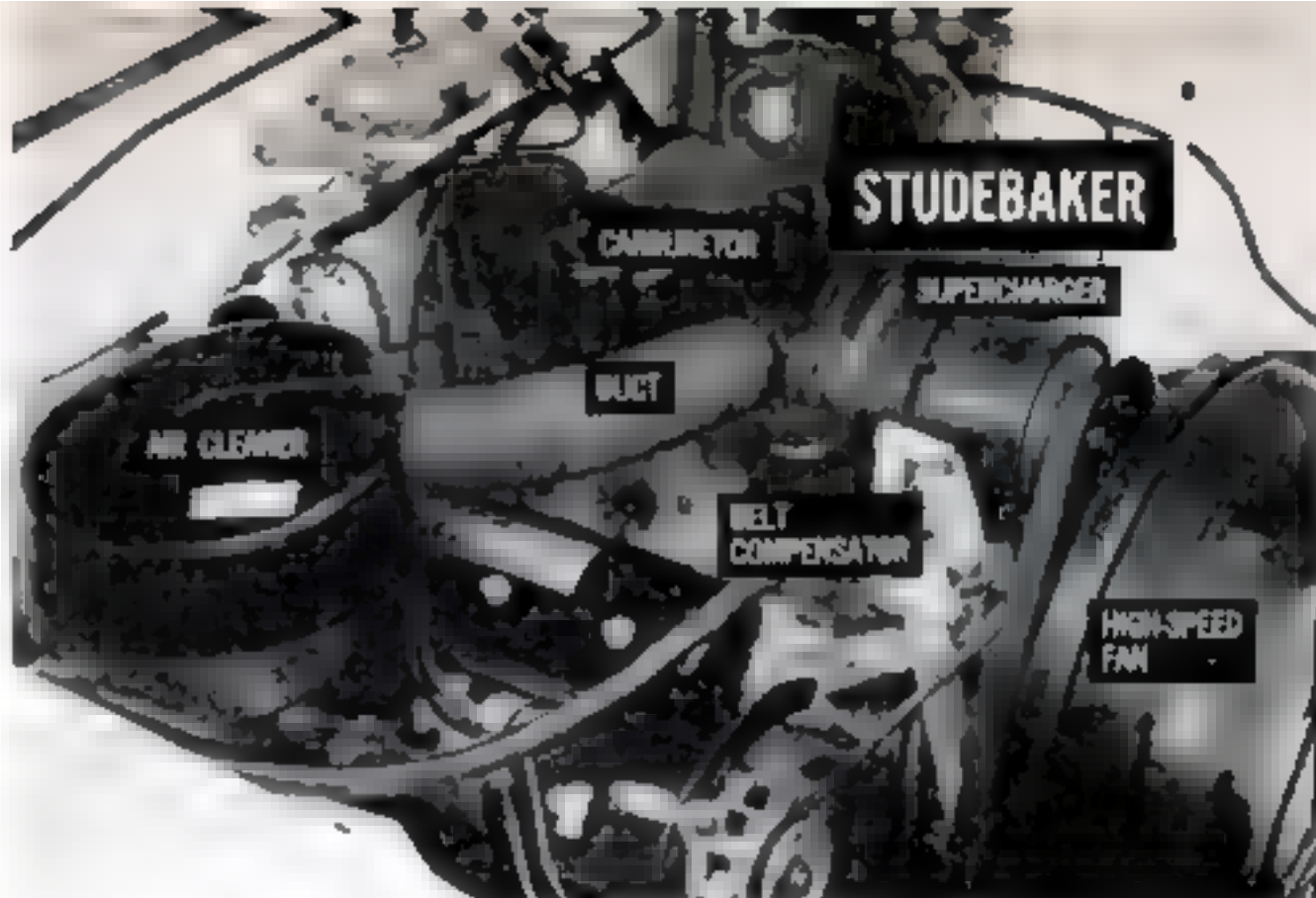
1. Whether enough buyers will pay a fat price bonus to get that fat power boost. (The Ford option, for example, adds \$447.40 to the bill.)

2. And whether fuel injection will develop into such a strong threat that only a trump like supercharging can match it.

Superchargers are old hat in racing-car circles; they're not even new on production vehicles. Cord had them in 1937, Graham a few years later and Kaiser as recently as 1955. Basically an air compressor, a supercharger rams a mixture of air and fuel into the engine's cylinders, filling them with a much heavier charge than piston suction alone could. Result: more power to move the pistons and, ultimately, the wheels.

The Studebaker-Packard blower is a standard McCulloch unit of the centrifugal type (PS, Dec '53), with the engine tailored to supercharger requirements. Ford uses a modified McCulloch unit developed over

ENGINE ROOM of Golden Hawk looks like this. Installation of the supercharger required moving the coolant thermostat over near the left cylinder bank. Because this blower has a high-boost, low-boost feature, effective belt length changes with diameter of blower pulley. Spring-loaded idler takes up difference.



Horsepower Race

the past two years in cooperation with Ford engineers.

By modifying the entire air-intake system of its 312-cu.-in. V-8, Ford has increased by 15 to 20 percent the amount of air crammed down the engine's "throat." The intake manifold has been enlarged and valve size increased. A special fuel pump of higher pressure and capacity feeds into a modified Lincoln four-barrel carburetor, sealed and pressurized to prevent spraying.

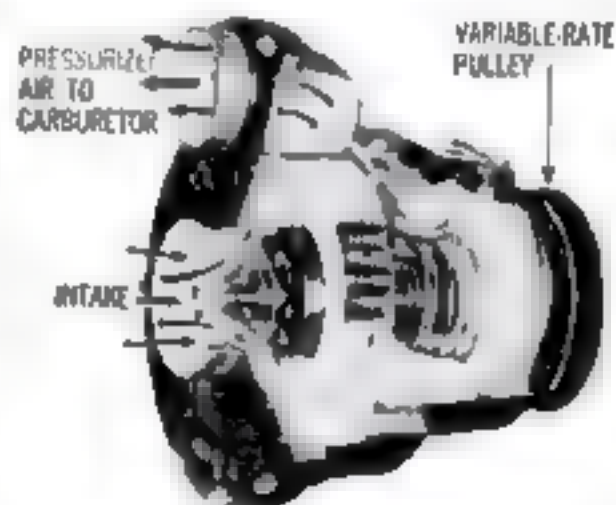
On the supercharged Ford the fuel-filter capacity is triple that of the standard filter. A dual breaker-point distributor is used instead of a single point. The cylinder heads are of special design, and an optional camshaft is available. All other components, including the block, are standard. A fixed pulley turns the supercharger (Studebaker uses a variable-rate pulley). Net effect of these changes is to kick up the normal 245 horsepower of the engine to 300.

On the Golden Hawk the water manifold has been changed so that the thermostat housing, normally upright, lies out of the way on its side. To overcome intake-manifold and carburetor pressure, the fuel pump is pressurized at 5.2 pounds per square inch, which keeps fuel from being forced back into the pump. Special connecting rods and main bearings on the Hawk take the heavier load. The standard Studebaker two-barrel carburetor is used, with altered linkage. Since a wet-type air cleaner might tend to siphon off oil it's not entitled to, a dry air cleaner is employed. The S-P supercharger provides a five-pound pressure boost, delivering far more fuel-and-air mixture into the cylinders than ordinary intake vacuum would.

The Golden Hawk will turn up a true 122 m.p.h. or better, depending on conditions.



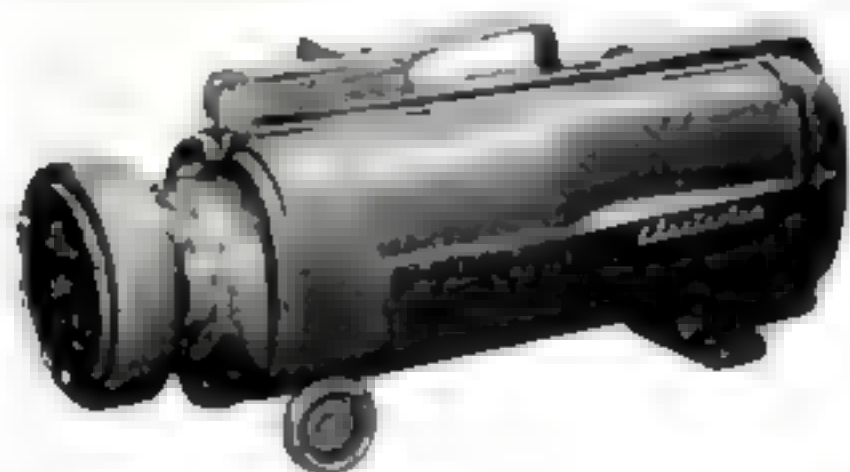
SPECIAL JOB, a 1956 Thunderbird owned by Clark Gable, uses a two-speed McCulloch blower. This car accelerates from 0 to 60 in six seconds.



CUTAWAY shows the centrifugal impeller used by Studebaker-Packard. The mechanism governing amount of boost delivered is at right in housing above.

[Continued on page 240]

Vacuum Cleaner Now Drills Holes



SOMETHING radically new in vacuum-cleaner attachments is the "Turb-o-Tool" shown at right. When you connect it to the suction hose, you are ready to drill, sand, or polish the car. But who gets to use the vacuum cleaner—is it His or Hers?

When the man from Electrolux attached the gismo to the hose of a shiny new tank cleaner, and calmly proceeded to drill holes in a block of wood, then quick-changed to disk-sand a table top, we were impressed. Particularly after he twisted off the gismo and vacuumed up the chips and dust he'd made.

The power unit, which weighs about two pounds, consists of a plastic turbine wheel geared to a threaded output shaft. A standard 1/4-inch chuck, a rubber sandpapering disk and sandpaper, a lamb's wool buffer and a combination key wrench and screwdriver are included in this basic kit, which sells for about \$25.

The floor accessory kit for scrubbing, polishing or buffing may be bought separately for about \$15 and includes polishing base, brushes and buffing pad.

Electrolux has beefed up the motor of its latest cleaner with 20 percent more power, but says that the Turb-o-Tool can be used with any of its previous models.—Herbert O. Johansen.

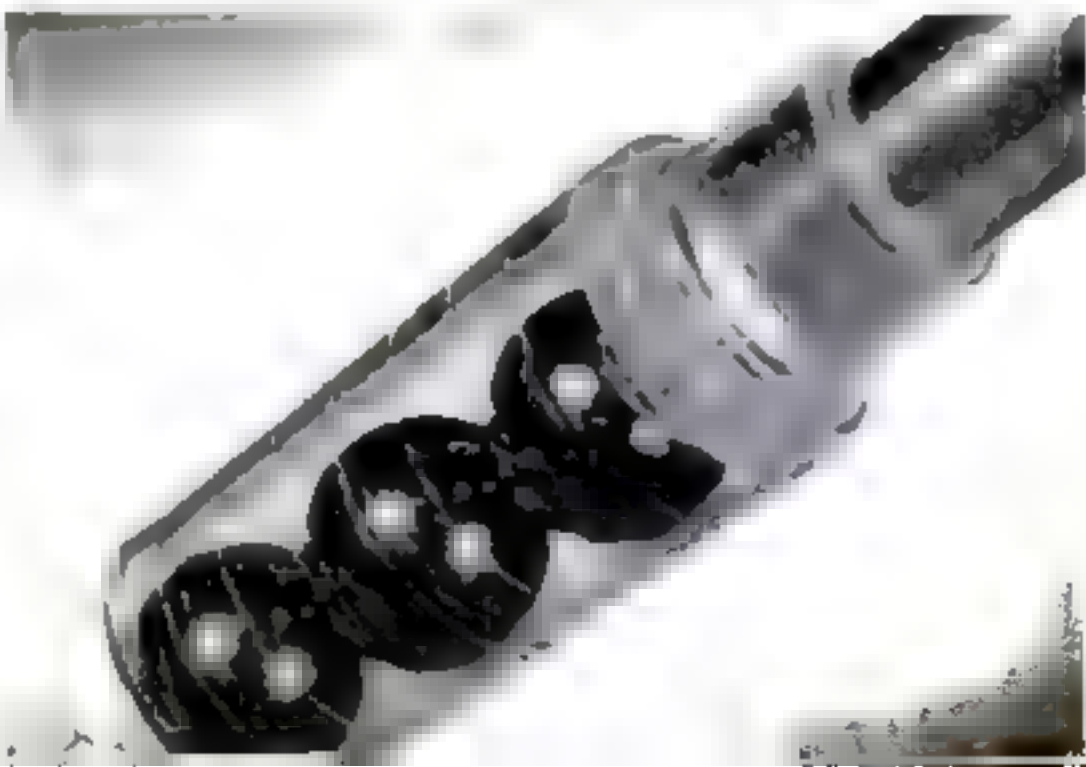


The new cleaner is gadgety even when doing



CLEANER'S SUCTION DRILLS A HOLE. This two-pound Turb-o-Tool attachment goes onto the end of the hose to power workshop jobs. The unit will run standard tools fitting a 1/4" drill chuck.

POWERFUL SUCTION makes it possible for the vacuum cleaner to operate power tools. In the demonstration below, the machine, at full power, is picking up three half-pound steel balls.





dirt patrol. Cover pops open and automatically stops machine when dust bag needs emptying.



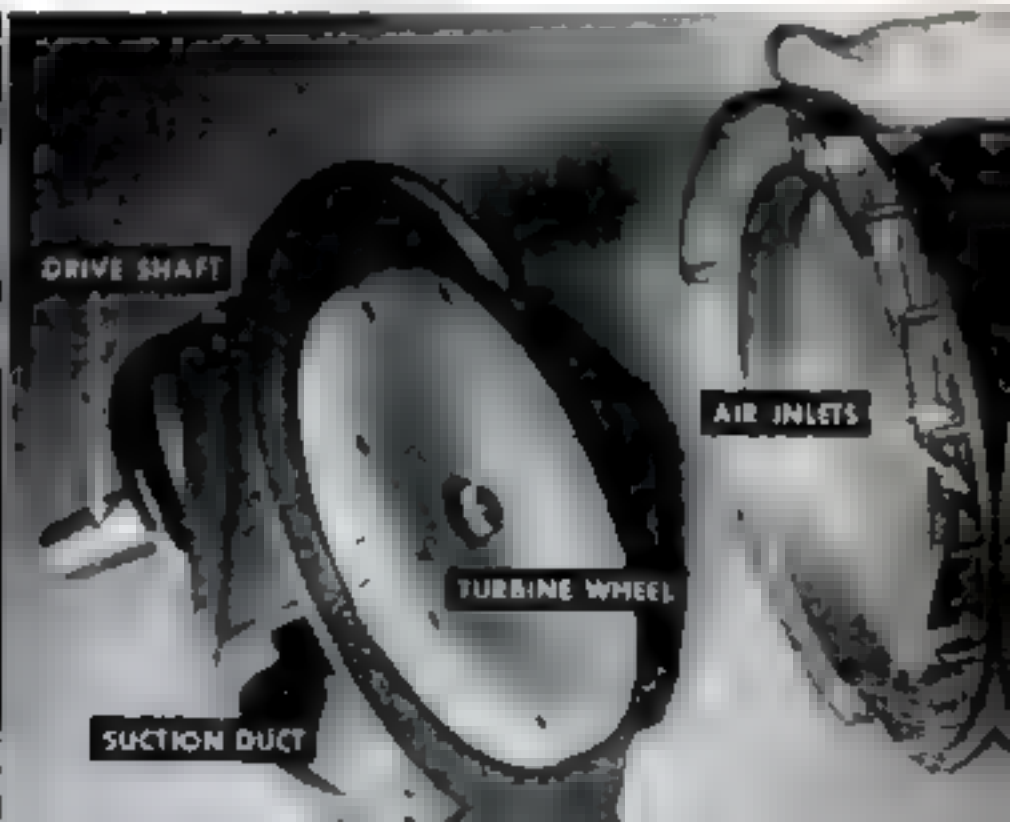
RENEWING LINOLEUM or hardwood floors is another job the turbine unit handles. A snap-on, cast-iron base gives weight to the floor kit's rotary brushes, which scrub, polish and buff.

BUFFING BONNET fits over a rubber pad. It's whirled by the turbine unit, too. Different kits supply tool and polisher accessories. Floor brushes come with circular splash guards.



SANDING DISK GOES TO WORK, with rubber backing pad replacing chuck, and iron base used to add weight. Shaft speed, 2,300 r.p.m. without load, can be reduced by a vacuum valve.

PLASTIC TURBINE WHEEL, operating through a single stage of gearing, spins the output shaft. Since this is an air-suction motor, nothing burns out if the tool stalls. **END**





Up she goes, with Dick Peck at the controls. On ground, XROE-1 folds into a small package.

One-man copter pins together

LATEST news in helicopters is the "rotor-cycle," a one-man flying machine. It can be airdropped for military use as a slender, 12-foot, 250-pound bundle of parts. One man can put it together, mainly by snap pins, and be airborne in 10 minutes. Prediction is that less than four hours of instruction will be needed to learn to fly it.

This first fully collapsible copter is the Hiller XROE-1. Developed for the Navy, it has been built and test-flown by Hiller Helicopters, of Palo Alto, Calif.

The engine is an air-cooled Nelson four-cylinder two-cycle job ordinarily used for powered gliders. Like an outboard motor, it starts with a yank (or yanks) of a pull-cord and burns a mixture of gasoline and oil. It makes a fierce racket.

Marines will use this fancy motor scooter

for observation, liaison, escape and small-unit tactical maneuvers. Performance details are secret but its top speed is probably about 60 m.p.h.

Care to buy one? As with helicopters in general, there's only one major obstacle to putting one of them in every big back yard—and it's one you can guess. Until mass demand brings mass production, the price must be prohibitively high. And how can you get the demand for helicopters up till the price comes down?

The Hiller people see no other production obstacle to putting out a rotorcycle at a motorcycle price.

Test pilot for the rotorcycle is Richard L. Peck, a tall, untalkative man who has been persuaded to tell you here what it's like to fly this aerial scooter.—*Darrell Huff*

How You Fly the One-Man Copter

By Richard L. Peck

Test Pilot, Hiller Helicopters

SLING one leg over the saddle of the rotorcycle, just as if you're climbing onto a bike. It's no trick. Your feet still touch the ground.

Strap yourself in good and tight. It's going to feel kind of insecure up there with not much around you but fresh air.

Put your feet on those pedals. They're the rudder control.

Take a good look at the dials sticking up between your feet. Those two are your whole instrument panel, all you have to watch. One is temperature, to warn you if the engine's overheating. The other tells r.p.m. That's the one to watch. Keep the needle within those two marked lines all the time you're in flight. You have a leeway of only 200 r.p.m.

I'll start her up for you. You can't reach the pull-rope from your seat.

I give it a yank—just as in starting an outboard or a garden tractor. Oops! Well, it usually takes two or three tries.

That does it! Can you still hear me?

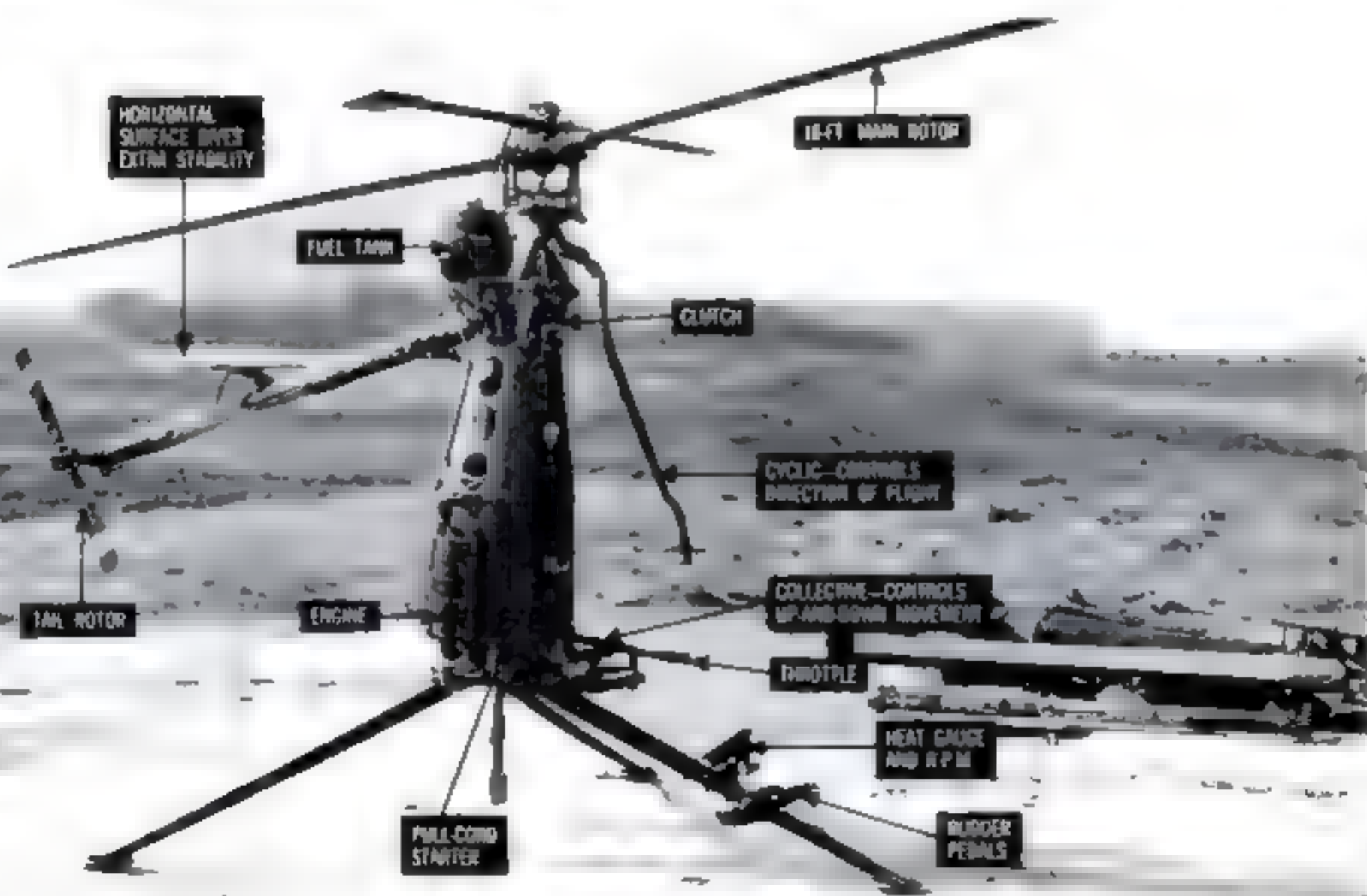
Okay. Take hold of the collective, the lever alongside your left hip. That controls the up-and-down movement by changing the pitch of the main rotors overhead. The handgrip on it is the throttle.

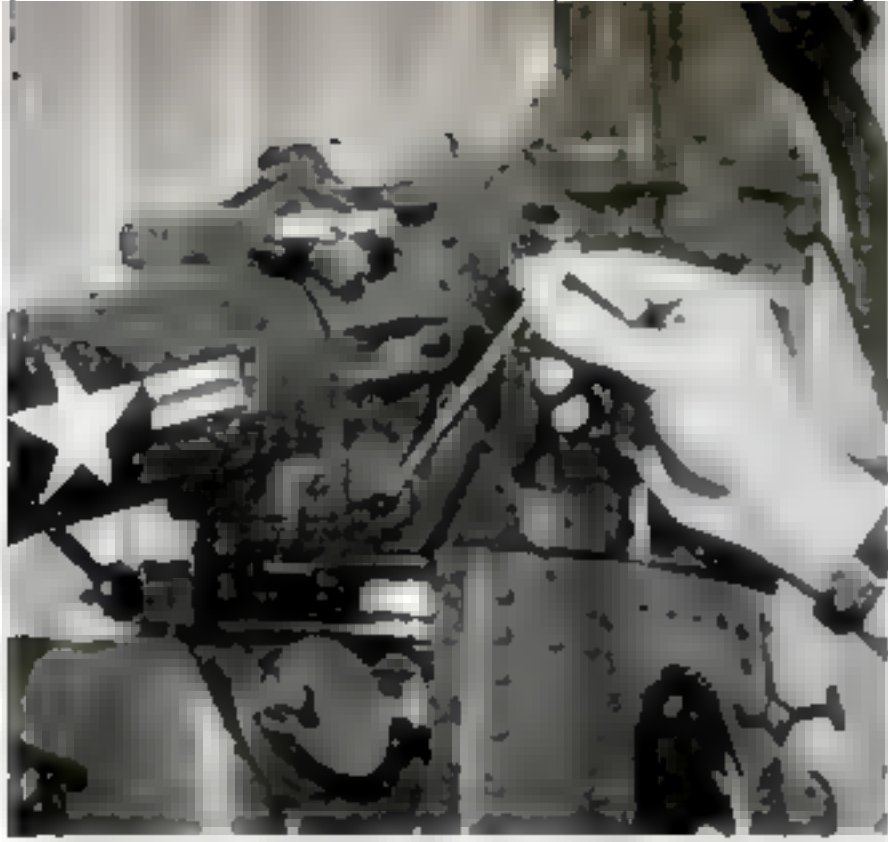
The throttle is similar to the one on a motorcycle. But since the lever comes from behind you, it works the opposite way. Twist it left to give her gas.

Okay. You're ready to take off.

Raise the collective and twist the throttle at the same time. That way you increase the power and the bite of the rotors together. Keep doing it, and keep on watching the r.p.m. so the needle stays in the marked zone.

You're off the ground now, and I'll





ROTORCYCLE BOOM ATTACHMENT: Ease of disassembling the Marines' one-man flying machine is shown by typical joint, in which simple snap-out pins are used to connect components.

bet you hardly knew it. Go on up a way. Keep throttle and collective coordinated now. That's the hardest part.

Now move forward. That's it. Use your right hand to push ahead on the cyclic, the lever that comes down in front of your face. Don't be surprised that you and the copter are leaning forward. That's what helicopters do when they go ahead.

Now slow up and hover. That's it. Pull the cyclic gently back.

Pull it a little farther. See, now you're backing up.

Get some forward speed again. Easy, now. A mile a minute seems pretty fast when you're hanging from nothing, doesn't it? Slow down a bit and try a turn to the left.

That's it. Move the cyclic to the left. You're skidding, because you didn't use the rudder. Give it some left rudder. That's better.

Straighten out. Pretty wobbly? You're overcontrolling—just as you probably did when you learned to drive a car.

Actually, what's fooling you is the lag. You moved the cyclic to the left. Nothing happened right away, so you moved it again a bit more violently. By the time both those motions caught up with you, you were way too far over. Keep your control movements gentle and give them time to take effect.

Let's lose some altitude. Move the collective down just a little and reduce

throttle as you do it. Always coordinate throttle and collective, and watch that r.p.m. indicator.

You've discovered by now one odd thing about the rotorcycle, compared with a fixed-wing job or even another helicopter. There's no wall or panel or anything like that in front of you to tell you whether or not you're flying on an even keel.

That's all there is to flying a rotorcycle. Control up-and-down by raising or lowering the collective, twisting the throttle at the same time to keep the r.p.m. close to constant. Control direction of progress by moving the cyclic the way you want to go. And use the rudder on turns.

Now let's try an experiment. Lift the collective without twisting the throttle. Your rotor blades are taking too much bite now for the power you're giving them. The r.p.m. is dropping—and so are you.

Give it more gas and build up the r.p.m. Now you're steady again.

But what happens if the engine dies on you? Then you must put the collective to full down position fast, to keep the r.p.m. within limits.

Try it. Throttle the engine back to idle. Now you've duplicated a case of engine failure. What's happening? Look down. Are you falling?

No. You have the same control of direction as before, by using the cyclic control right there in front of you.

Let her glide down. You can put her where you want her, just as if you were using power.

You're going to hit the ground too hard for comfort, though. Just before you sit her down, pull up hard on the collective

Do it just right and you land as softly as a feather—whether the engine's running or not. That's the nice thing about any helicopter, even Bitsy here. **END**

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NEXT MONTH: The story of the extraordinary plane that had already set two records before Lindbergh flew it to Paris 30 years ago. Read "Lindbergh's Amazing Airplane" in May PS.



Don't Believe These Tall Tales About Rattlesnakes

***They have fooled too many folks too long.
An expert explodes them here for you.***

By Laurence M. Klauber

Consulting Curator of Reptiles, San Diego Zoo

QUEER and unexpected effects of rattlesnake venom on man and animals have often been reported; some of these have been so fantastic as to border on the miraculous. Equally strange are some of the recorded results of venom on plants or inanimate objects, and some of these have been so often repeated as to become true folk tales.

One of the oldest is the ax-head story, first told, I believe, by Cotton Mather in 1714. In this, a rattlesnake strikes the metal bit of an ax. The metal changes color and, when the ax is used again, the discolored edge breaks off. The ax tale is the only one known to

**Many a whopper has been told
about the length of a rattler.**



me in which rattlesnake venom affects metal, but there are many stories of its effects on plants and wood. In one of the oldest of these yarns, a hoe handle is struck by a rattlesnake and within an hour has swelled to such an extraordinary extent that it pops out of the eye of the hoe.

Another old and controversial myth relates to the supposed power of a rattlesnake to charm its prey. Briefly, it is the belief that rattlesnakes have the power of so charming, fascinating or hypnotizing prey that it makes no effort to escape, and even moves helplessly toward its doom. In its most acute form,



No rattler is as obliging as this.

the myth recounts how a rattler at the foot of a tree has only to fix a baleful eye on its prospective victims aloft, whereupon birds come fluttering down, or squirrels descend helplessly, and deliberately walk into the snake's open mouth.

Occasionally, carnivals or snake shows, to stimulate the apprehensive curiosity of the customers, state that attendants will be on hand to lead out anyone who

may be overcome by carelessly exchanging stares with a rattlesnake.

At 3001, there have been no observations on captive rattlesnakes with prey that verify any theory of fascination. Birds and small mammals placed in cages with rattlesnakes, as soon as they have become used to their new surroundings, pay no attention whatever to their reptilian cage mates. They run about, nestle against or perch on the snakes; and, as far as rats and mice are concerned, if not supplied with food, they will frequently eat the heads, tails or rattles of the snakes. It is true that occasionally a hungry snake will strike one of the animals and kill and eat it; but unless this occurs, the animals evince no fear. It cannot be supposed that behavior patterns in the wild could be so different that snakes, which regularly fascinate or charm their prey there, would never show the slightest ability to do so in captivity.

Another belief is that snakes can milk cows. This is an extremely ancient and widespread myth, and is told of many different kinds of snakes, occasionally including rattlers. Milk is not a natural food of these reptiles, and stories of their fondness for it are imaginary.

Another myth, widespread throughout the West, is to the effect that it is unnecessary to aim carefully when shooting a rattler, since the snake will automatically line up his head with the barrel of the gun and the first bullet will inevitably find its mark. An even less possible variant maintains that a rattler will strike at and hit the oncoming bullet.

The derivation of this myth, I think, lies in the fact that one ordinarily shoots a rattler at a much closer range than almost any other object. The aim therefore is generally good, although I can

Editor's Note: Laurence M. Klauber, who gathered these myths, is probably the leading U.S. authority on rattlesnakes. He has recently completed two fat volumes on rattlers' "habits, life histories and influence on mankind." The books, published by the University of

California Press are based on "first-hand experiences with more than 12,000 rattlers in the field and laboratory." Mr. Klauber included a chapter on "Myths, Folklore and Tall Tales." The accompanying article consists of passages chosen from that chapter.

testify that it is quite easy to miss a rattler even at close range, especially with a derisive audience on the sidelines.

At any rate, a simple experiment will prove that an angry rattler in his striking coil does not automatically line up with the weapon, as the following notes from my diary show:

"June 7, 1945: This morning I tried the gun-barrel experiment on several rattlers with absolutely negative results. Both a 20-gauge shotgun and a .410 pistol were used. I had two large western diamonds, a Great Basin rattler and a sidewinder. Also a red diamond, but he can't be counted as he wouldn't assume a fighting pose. It was a bright, sunny day. The snakes showed, by facing a person and assuming a defensive coil, that they could see movement readily enough. They were tried with the guns close and distant (from a few inches to several feet). In no case was there any tendency of a snake's head to follow the barrel. When the gun was aimed so that it would just miss the head, the snake would not move the slight distance required to get in line, although it was looking at the gun barrel and it would have had to move its head only an inch or two, laterally, to line up with the barrel. With the breech open it was easy to watch the rattler through and along the barrel to determine just where a shot would strike."

Rattlesnake lengths are usually exag-



A rattler's bite does not affect metal.



A rattler's gaze is not hypnotic.

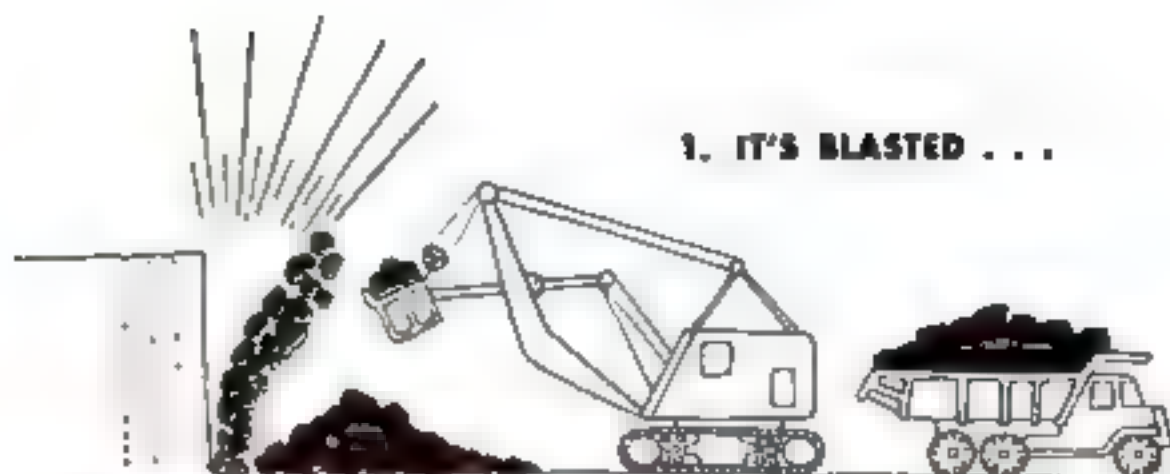
gerated; in addition, some measurements are based on dried skins, which can be stretched up to half again as long as their original possessors. Thus we hear of eight- and nine-foot rattlers in Florida and Texas, where a seven-foot snake would be quite exceptional. But although a nine-foot snake is at least a possibility, some of the stories heard about large rattlers enter the realm of the fantastic and are to be considered myths. I should say that rattlesnakes ought to be placed in the mythical category at 10 feet, thus allowing for some exaggeration.

A myth of wide distribution, particularly in the Missouri Basin states, is to the effect that rattlesnakes and bull snakes have crossed, producing a particularly dangerous hybrid offspring having all the venom of a rattler but with the speed and energy of a bull snake, and, of course, without the identifying rattles. Actually, there is not the slightest ground for this idea.

Many of the early accounts of rattlesnakes dwelt at length on their offensive odor, particularly when congregated at their dens. It was most often likened to the smell of cucumbers, and was said to be perceptible at a great distance. This idea is still widely prevalent, but, as a matter of fact, rattlesnakes are virtually odorless, even when there are a number together.

An ancient legend, which has crossed

[Continued on page 242]

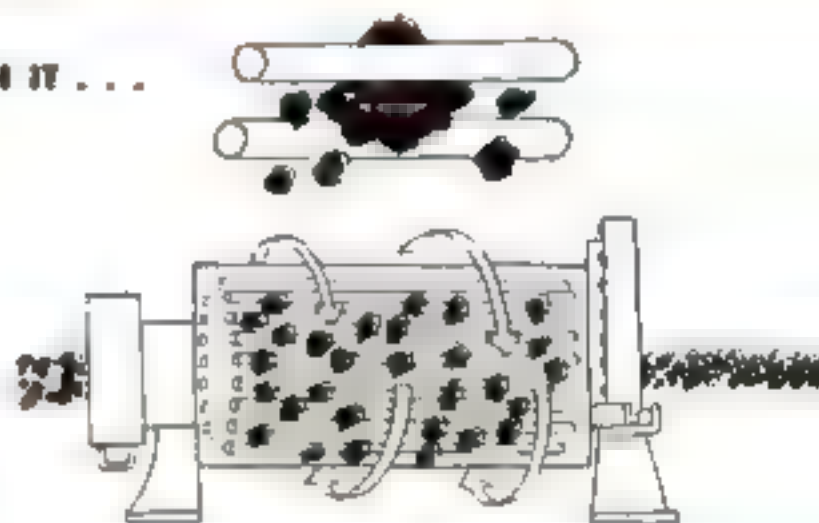


1. IT'S BLASTED . . .

SYNCHRONIZED BLASTS rip ledge. Chunks of ore go into huge 45-ton trucks specially lined to resist abrasion.

4. RODS SMASH IT . . .

WITH A ROAR like a cannon, a "JPM" starts boring seven-inch blasting holes in rock too hard for drills to pierce. Tough taconite is fractured into chips by alternately heating it white-hot with a jet flame, then spraying it with cold water.



ROD MILLS get into act, grinding the chunks of ore to coarse sand

How They Tamed the

As America's famous iron mines run low, new machines tackle a tough, ugly ore called taconite.

By Edward D. Fales Jr.

IRON-ORE men call taconite the meanest, toughest rock on earth. It chews up tools, laughs at drills, grinds the teeth off power shovels in eight hours flat. When you haul it, its jostling razor edges (nearly as hard as diamonds) saw bottoms out of ordinary freight cars.

Yet this angry black rock, which is loaded with rich iron ore, at last has been lassoed and tamed.

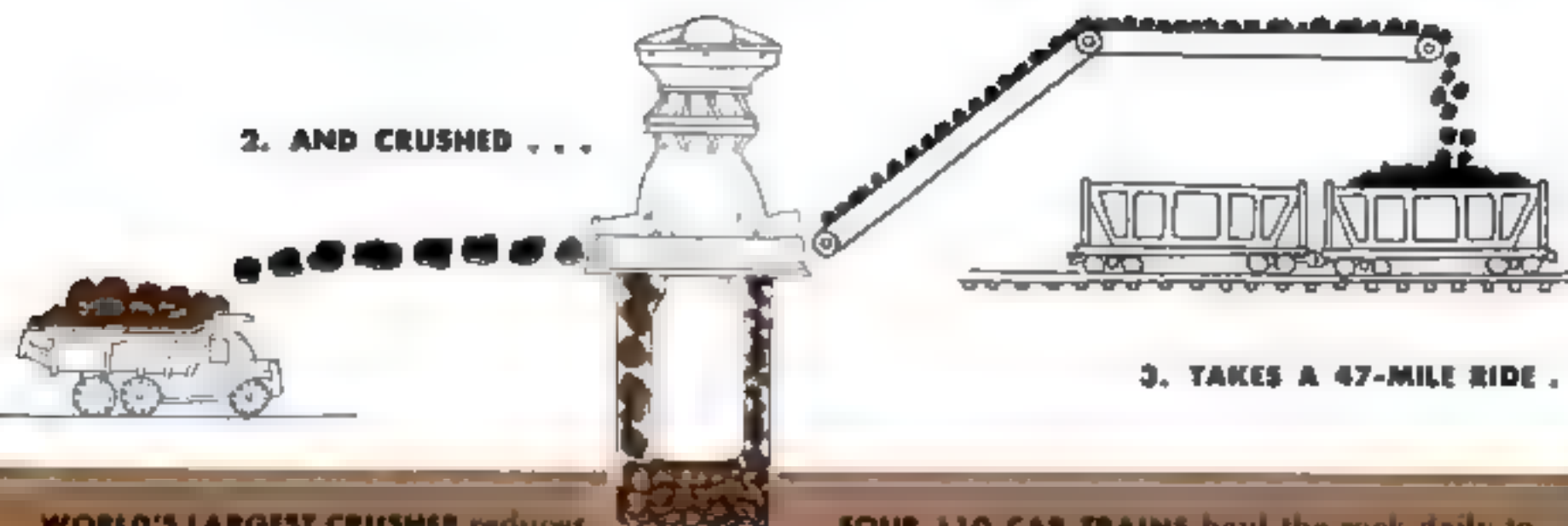
This month, the first ore ships of 1957 will come whistling down the Great

Lakes. One in eight will be loaded with the strangest-looking ore that ever came into Cleveland or Toledo or Chicago. When the hatches are opened millions of little black marbles will come out bouncing and clattering—taconite for our hungry blast furnaces.

The first shipload came down from Minnesota a year ago. This year nearly 4,000,000 tons will go into steel for your car and many other uses.

This great "river" of taconite has begun flowing just in time. The iron ore that put muscle in America is petering out. This is the dusty-red, easy-to-get Mesabi ore that builds our cars, washing machines, railroads, skyscrapers; that supplies our guns and tanks—and won the last war. Your own family's safety and

2. AND CRUSHED . . .

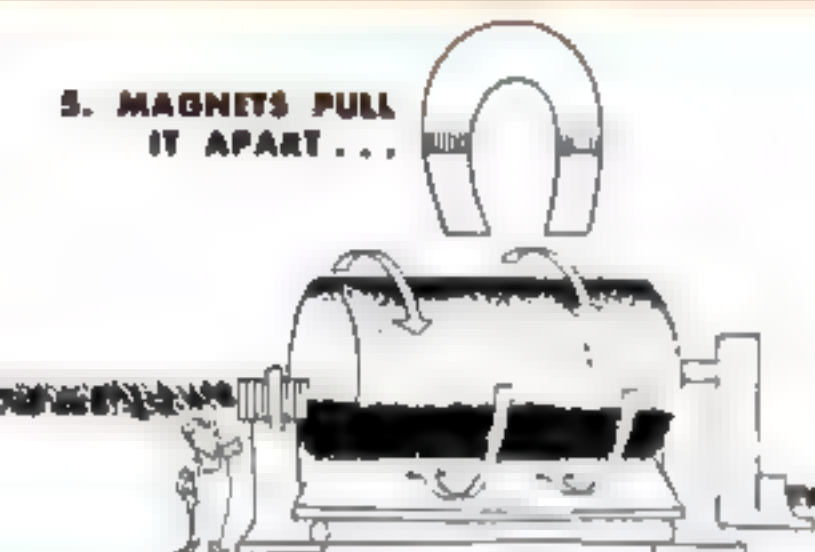


3. TAKES A 47-MILE RIDE . . .

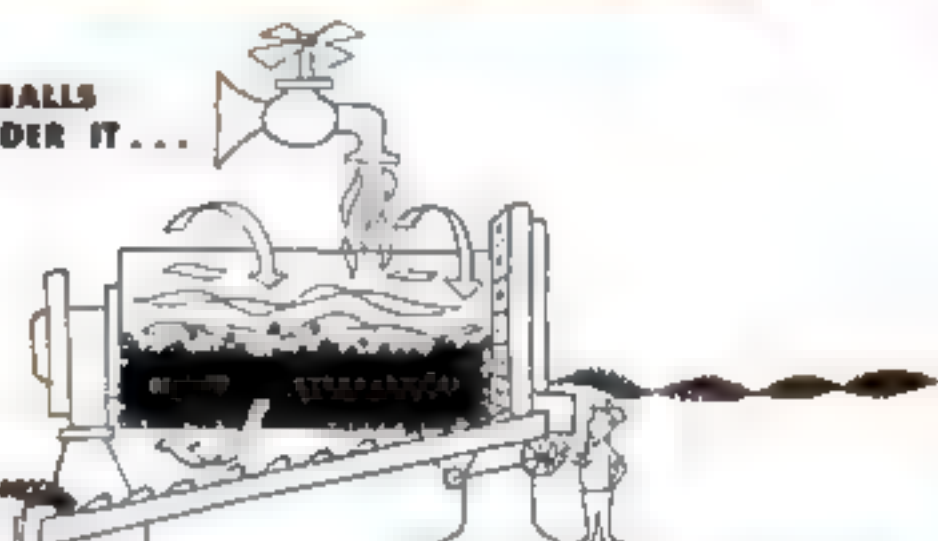
WORLD'S LARGEST CRUSHER reduces chunks to baseball-size rocks.

FOUR 110-CAR TRAINS haul the rock daily to next-stage mill on Lake Superior.

5. MAGNETS PULL IT APART . . .



6. IRON BALLS POWDER IT . . .



PULL WORKS HERE: Magnets pick out ton of magnetic ore for every two tons of waste silica.

STILL TOO BIG, the ore is pulverized in water to .004" diameter by rotating ball mill.

World's 'Meanest' Rock

comfort—even your pay check—have been largely based on Mesabi ore.

After World War II, steel men took a startled look at what the Arsenal of Democracy had taken from the Mesabi pits. "Suddenly," says one, "the barrel's bottom was showing."

And so America began to import ore—from Africa, South America, Labrador. We built steel plants on the East Coast, to be near the ships. This was fine, but . . . suppose war comes again? Our foreign ore might be cut off.

Steel men turned in sheer desperation to taconite—the cussword of the Mesabi range.

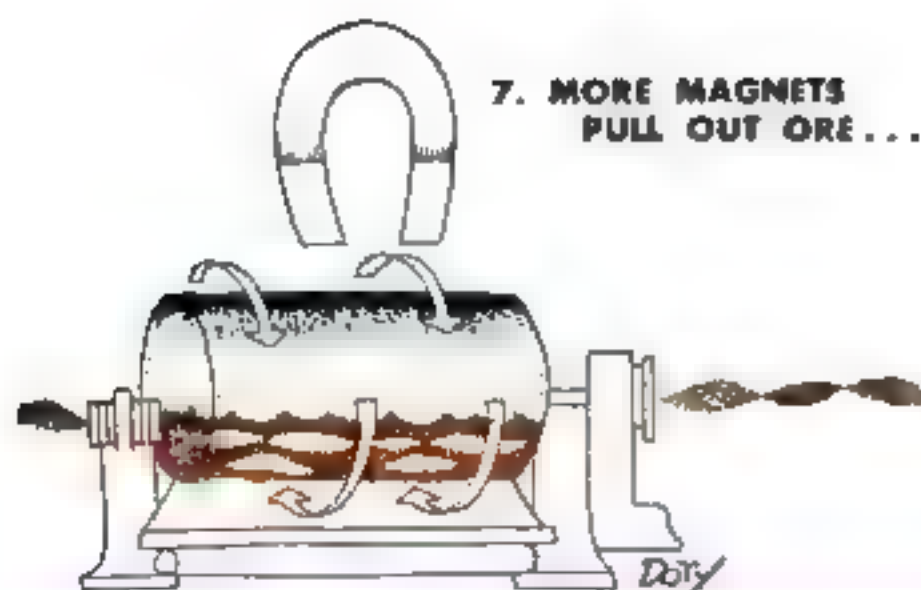
The Mesabi range zigzags like a 100-mile lightning strike across northern Minnesota. In mid-range, like raisins on a

cake, are surface pits of red ore, easy to shovel and ship. These are the pits that are petering out.

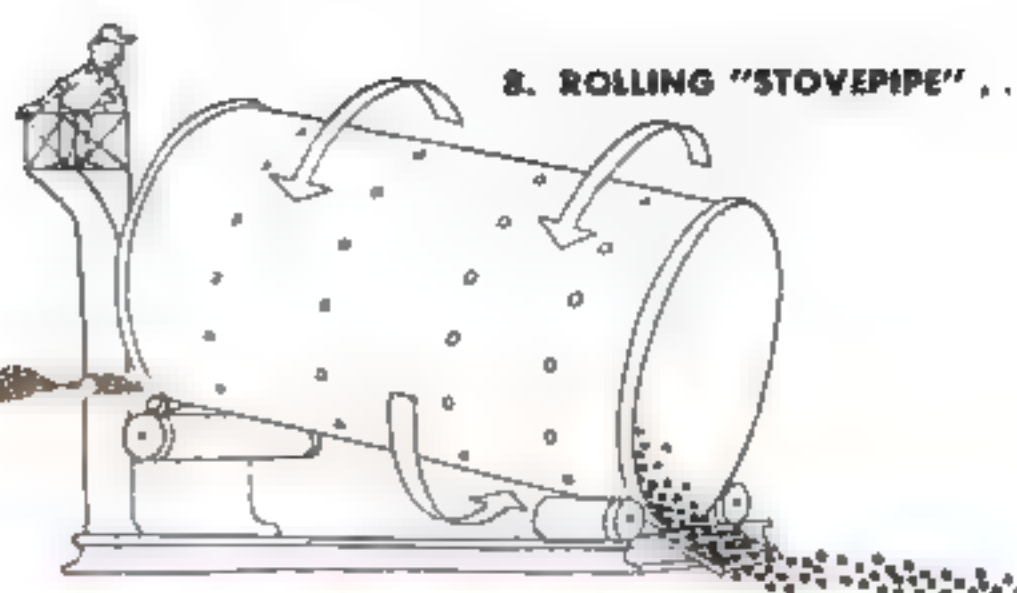
At the lightning strike's east end, in a forest wilderness, are flinty outcroppings. These are the taconite ledges.

For years taconite was believed to be impossible to mine. But when the Reserve Mining Co. was formed recently (by Republic Steel and Armco Steel) its goal was to blast iron out of these ledges. Engineers knew it had to be done.

First problem was drilling. In a quarter-hour, with the strongest steel drill, you can go *three inches* down in taconite. Then you throw your drill bit away. It's had it. And three inches is nothing. Blasters needed holes at least 18 feet deep—thousands of them—that could be



MAGNETS AGAIN: They lift out a ton of rich dust for every ton of waste "tailings."



RICH, MOIST ORE is now too fine for furnaces, so it must be "snowballed" in rolling drums.

quickly bored into the ore for blasting.

Linde Air Products Co., which sells oxygen, offered to tackle the problem. Using an old Indian stunt (heat a rock, then chill it) Linde engineers designed a special oxygen drill called a JPM—"jet piercing machine." It spits a high-velocity stream of oxygen and kerosene straight down at the taconite bed. Suddenly, with a thud like a five-inch gun, the stream ignites into a 4,700°F. jet flame. The taconite glows white-hot. Then a cold water jet leaps at the blistering rock.

This punishment "spalls" tough taconite into millions of chips that are spewed from the hole by steam. In an hour the JPM goes down 40 feet and leaves a hole seven inches wide.

With enough JPMs the engineers felt they could do a job. So steel men sank a heavy investment (\$600,000,000) into two plants.

Plant No. 1, at Babbitt, Minn., 47 miles inland in woods teeming with bear, uses

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What will you die of? Mortality tables chart the grim hazards of today's world. Read Popular Science for May.

some of the world's largest machines to smash taconite and bring it to heel.

Plant No. 2 is at Silver Bay, a new harbor on Lake Superior. This is where the crushed rock is brought so precious iron ore can be taken from it and formed into billions of marbles ("pellets").

Sounds like cannon fire roar today from the 1½-billion-ton ore beds as the JPMs boom and scream. Now and then you hear a roaring *whoo-oosh!* and a whole cliff collapses.

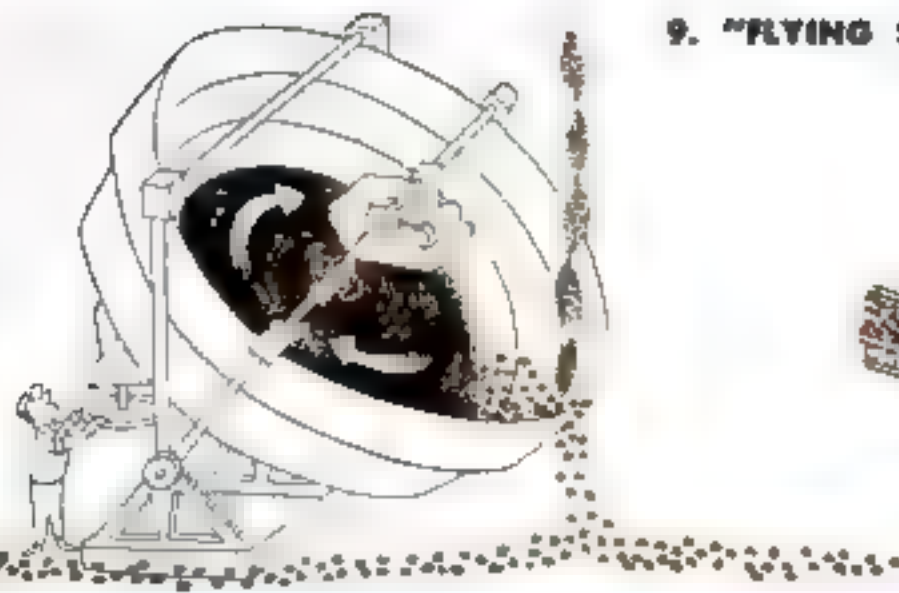
The JPMs drill whole rows of blast holes. These are fired in fast sequence—like the cylinders in your car. The rock wall disintegrates in a neat pile.

To smash the chunks (some are as big as your piano) engineers dug a dizzy cavern, deep as a 15-story building, in nearby granite. Into this they sank the world's largest crusher, a bell-shaped chunk of steel that weighed 1½ million pounds. Taconite chunks fall between this "bell" and its casing. Then two 500-hp. motors start running.

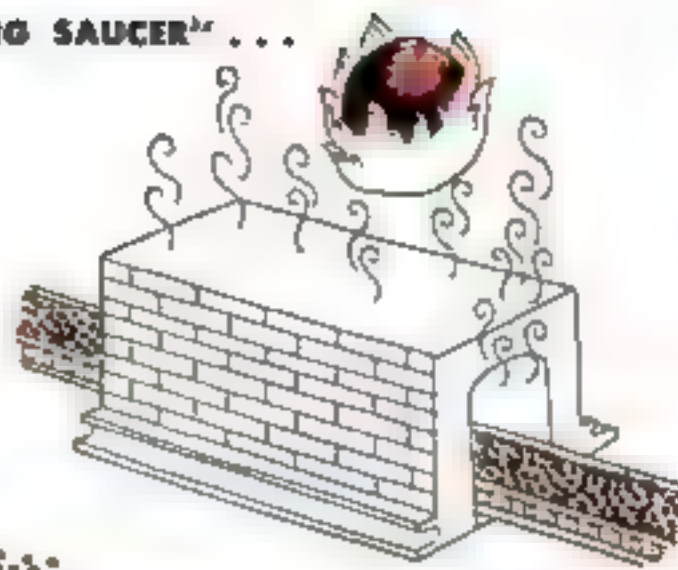
These are geared to barely stir the bell—a slight ⅛ of an inch—on its axis. But that is enough. The bell grunts a little, and chunks spill out—nutcracked to baseball size in 40 seconds.

If this is hard on the taconite, it's also hard on the gyro-torque crusher. So bell and pit have liners of alloy steel, which are replaced every 30 days. Even with this, when taconite is poured in, it's never allowed to hit the bell. Its sharp edges, which easily cut glass, would chew the bell away. And so taconite almost always falls on taconite.

Core of the bell is a shaft 26 by 2½ feet, one of the largest forgings ever made. Two spares are kept handy. "If all should break," says an engineer, "it would take seven months to forge one."



9. "FLYING SAUCER" . . .



10. IT COMES OUT BAKED



ANOTHER WAY to "snowball" fine ore is in "saucers." The balls come out coated with coal.

OVEN burns off coal dust, giving hard-coated ore marbles ready for the steel furnace.

After meeting its master in the primary crusher, the taconite spills into two smaller crushers. Then it rides back to the surface on the world's strongest conveyor belt, a steel-cable-reinforced job that works under tension of 120,000 pounds.

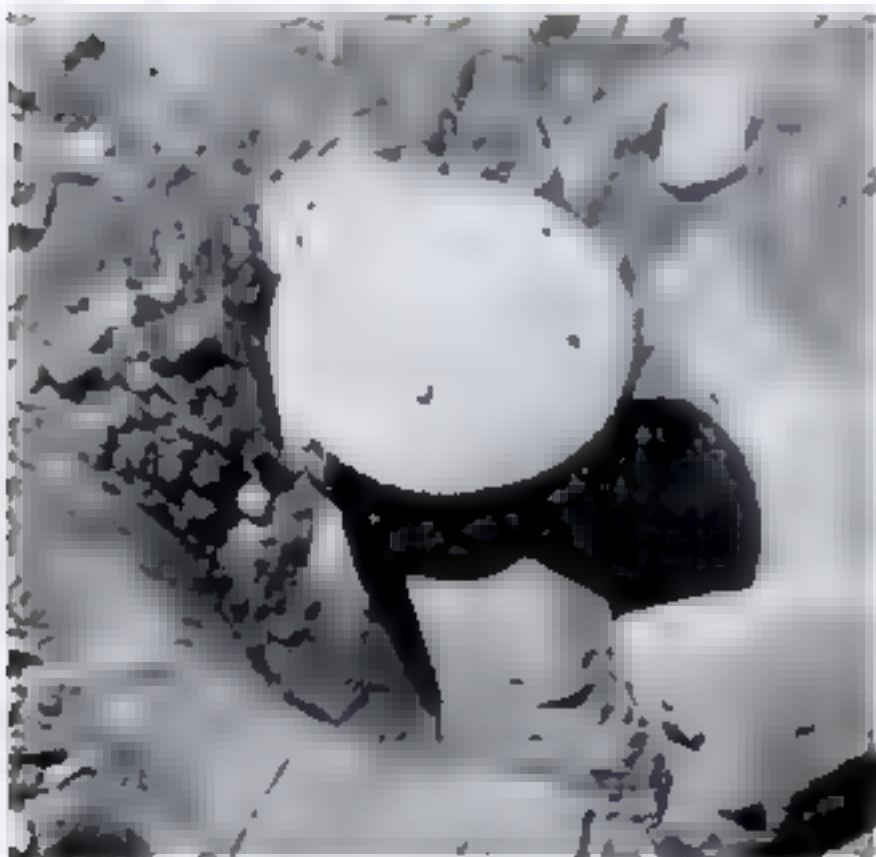
Now the taconite takes a 47-mile ride over a brand-new railroad to Silver Bay. Here other mills seize the "tough guy" of rocks, and hammer him down still more to size. Heavy iron rods flail the chunks down to a sand. A barrage of steel balls beats it to a powder finer than talcum. But the rock is still fighting back. So great is the abrasion that 90

tons of new steel has to be shipped into the plant every day to replace parts chewed out by taconite.

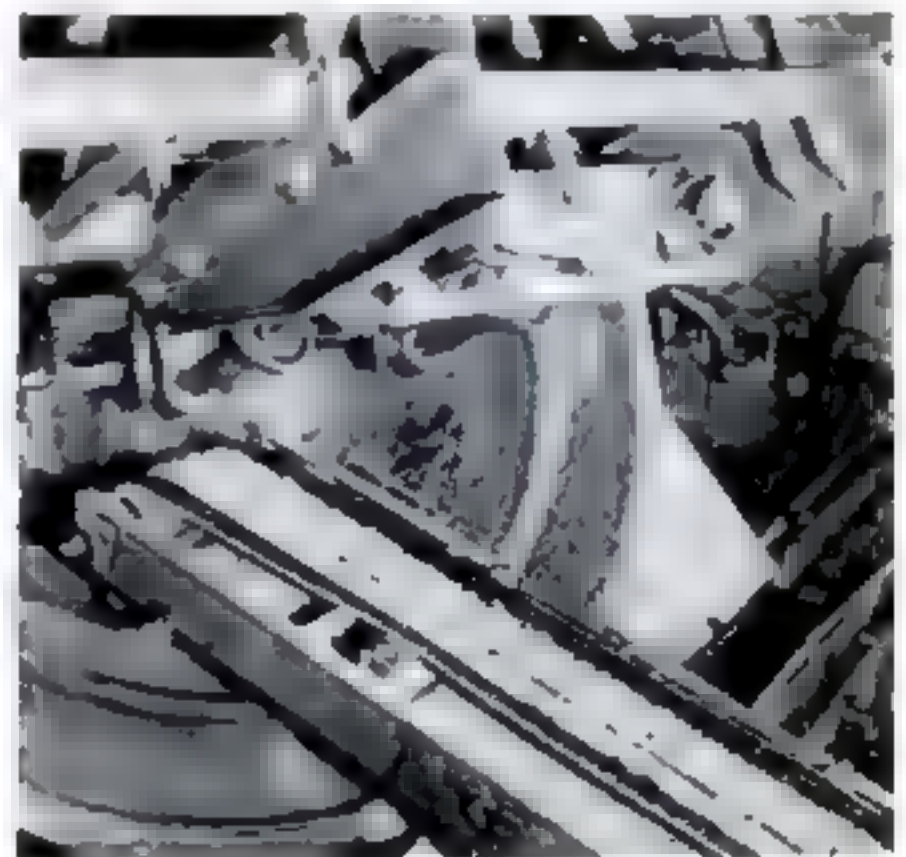
But eventually taconite defeats itself. Being magnetic, it can be washed over magnets that pull out the loosened grains of ore. Here, however, the engineers hit another snag.

"The waste, pure sand, is so fine," an engineer said, "that if we stacked it up it would blow all over Minnesota." And so the mountains of waste, 20,000 tons every day, are flushed far down the sloping bottom of Lake Superior, to a hole that luckily is 900 feet deep.

The ore now freed from the taconite

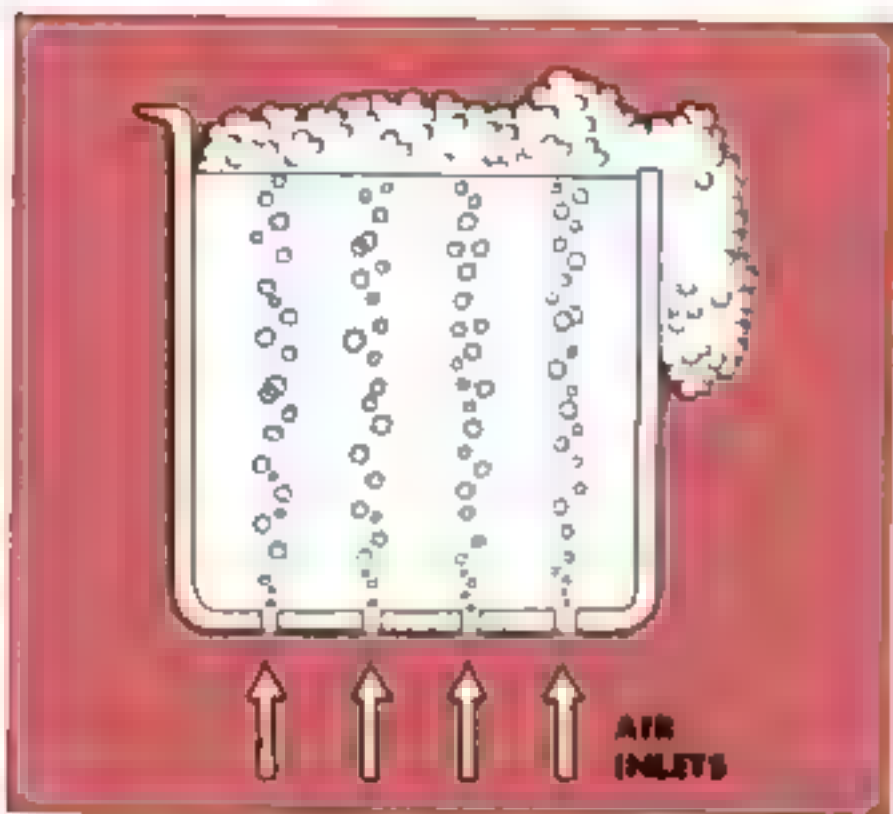


CRUSHER'S OPEN MAW—30 feet across—is shown here, ready to swallow huge chunks of taconite. Steel liner plates, battered and torn by razor-edged rock, are chewed away in 30 days.



WHIRLING SAUCER AT WORK: Crushed and moist, ore is belt-fed into this spinning steel dish. Here it "snowballs" itself into marble-sized pellets, ready for oven (see top of page).

When the bruising ends, ores haven't a speck of fight left



"BEER SUDS" METHOD of separation is used with nonmagnetic jasperite. Powdered rock falls into oleic acid solution; iron-bearing ore floats over top with "suds"; tailings remain.

could never be used in a blast furnace. A furnace inhales four tons of air for every ton of iron it makes. In the resulting hurricane, fine taconite ore would blow right out the stacks.

But at the University of Minnesota one day, Prof. E. W. Davis made a discovery. If he moistened a handful of the tiny grains and rolled them downhill they "snowballed" into marbles $\frac{3}{8}$ inch in diameter. Here was the answer.

So in the Reserve plants the ore falls into revolving "stovepipes." As it rolls up one side it falls back in moist, black marbles. These are mixed with coal dust and cooked. When the coal burns away, the marbles are as strong as if molded at a pressure of 15 tons per square inch. Taconite is getting its muscle back again!

These pellets not only stand up well in shipment but make excellent ore charges for blast furnaces.

As *shiploads of taconite* move south toward the steel mills today they're joined by ships bringing still another new "pelletized" ore from the north. In nearby Michigan, ore men have tapped a rich cousin to taconite, "jasperite." Jasperite is milder stuff than taconite. Its ore is not black magnetite but brownish hematite. Being nonmagnetic, a different, "beer-

suds," process is required to extract this type ore.

The jasperite, powdered, falls into vats of water and oleic acid (one of the fatty acids). As air bubbles up through the vats, each bubble lassoes particles of iron-bearing powder to which the oleic acid likes to cling. These bubbles form suds that overflow—like suds off a beer glass. The suds are collected and the iron ore extracted.

The jasperite ore is rolled into balls, too. But instead of rolling in drums, it is belt-fed into whirling steel dishes called "flying saucers." Oddly enough, the dishes are patterned after old noodle-making machines used in Hungarian kitchens.

At the *furnaces*, both jasperite and taconite marbles are mixed with red Mesabi ore. But the new ores are richer than the Mesabi ore (64 percent pure iron as compared with 50 percent). Result: four blast furnaces loaded with taconite or jasperite alone could turn out

NO END OF TROUBLE

Many troubles beset the men who built the two taconite plants in the Minnesota wilderness—one of the greatest engineering jobs ever attempted.

"I knew this job was going to be different," one engineer said, "the day the bears began knocking down our transits."

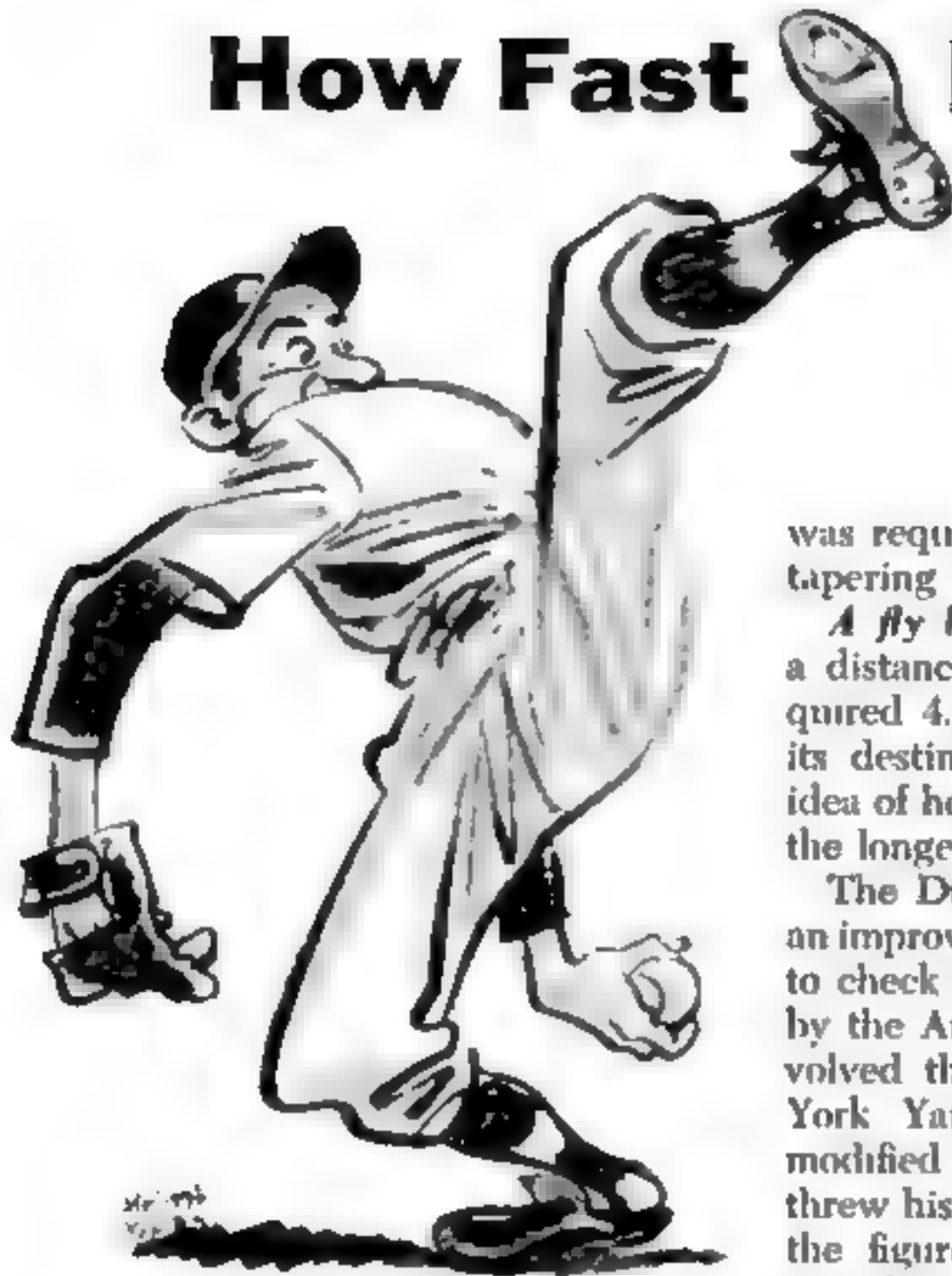
as much iron as five furnaces charged with Mesabi.

Thus taconite and jasperite (plus foreign ores) are taking the strain off our Mesabi reserves. Much of the latter now can be saved for emergencies.

But meanwhile the steel men hold another card up their sleeves.

The nine-mile long taconite beds, they are beginning to suspect, may be only the "lip" of an underground bed. Some geologists think that Lake Superior itself may be only a pool of cold water lying in a huge "dish" of taconite. But even without tapping this "dish," we have enough taconite to last generations! END

How Fast Does a Baseball Travel?



SOME years ago, U. S. Army scientists devised a machine with which to measure accurately the velocities of small moving bodies, including baseballs.

When the Army made its measurements, Mark Koenig was playing second base for the New York Yankees. A ball thrown by him just as fast as he knew how to throw it was clocked at a speed of 127 m.p.h., or about the top speed of a modern eight-cylinder automobile. The ball was thrown over a distance of 60 feet, six inches.

At the time the Army ran its speed tests, Bob Feller of the Cleveland Indians was in his prime and was widely known as a speed pitcher with a very fast ball. However, his fastest ball was clocked at only 98.6 m.p.h. This was nearly 30 m.p.h. under the speed of the ball thrown by Koenig. The difference in velocity was accounted for by the increased distance over which Bob Feller

was required to throw the ball. A sharp tapering off in speed resulted.

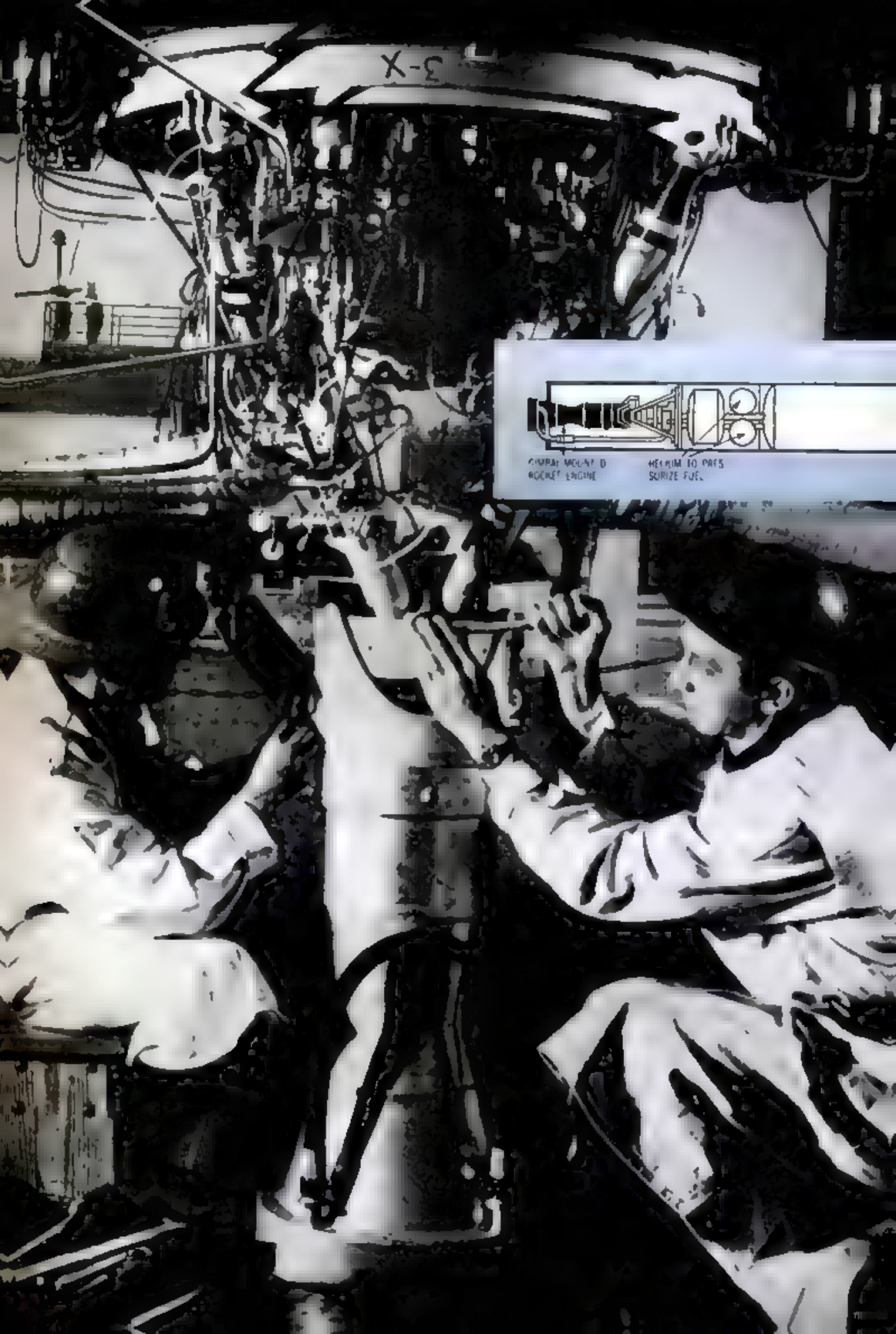
A fly ball struck to the outfield over a distance of 98 yards, or 294 feet, required 4.3 seconds [47 m.p.h.] to reach its destination. This will provide some idea of how rapidly speed tapers off over the longer distances.

The DuMont Company recently used an improved electronic device with which to check the figures compiled years ago by the Army. One of the tests made involved the famous pitcher of the New York Yankees, Bob Turley. Using a modified oscillograph, past which Turley threw his fastest pitch, it was found that the figure recorded checked with the Army's results. Turley was found to pitch at the rate of 94.2 m.p.h., or four miles under the top speed made by Bob Feller when he was in his early twenties.

Years ago, when golfer Gene Sarazen was at the peak of his fame, the speed of a ball struck by him in a drive was accurately measured. It turned out to be less than the speed of the baseball thrown by Mark Koenig. The golf ball was clocked at 176 feet per second, which amounted to the rather modest speed, comparatively, of 120 m.p.h.

A struck golf ball is not only beaten by a well-thrown baseball (Koenig's) but also (and this is surprising) by a well-hit tennis ball.

Years ago when Bill Tilden, the great champion, was in his prime (1931), his powerful service accounted for tennis-ball speeds up to 151 m.p.h., or 31 m.p.h. faster than the golf ball teed off by Gene Sarazen.—Raymond F. Yates, in *"Faster and Faster"*; Harper & Bros.



X-3



GENERAL ELECTRIC
ROCKET ENGINE

HELMHOLTZ
SOLAR FUEL

3 Mighty Engines to Launch Satellites

Upon three rocket motors hangs the success of the ship of adventure that may put man-made moons in the sky.



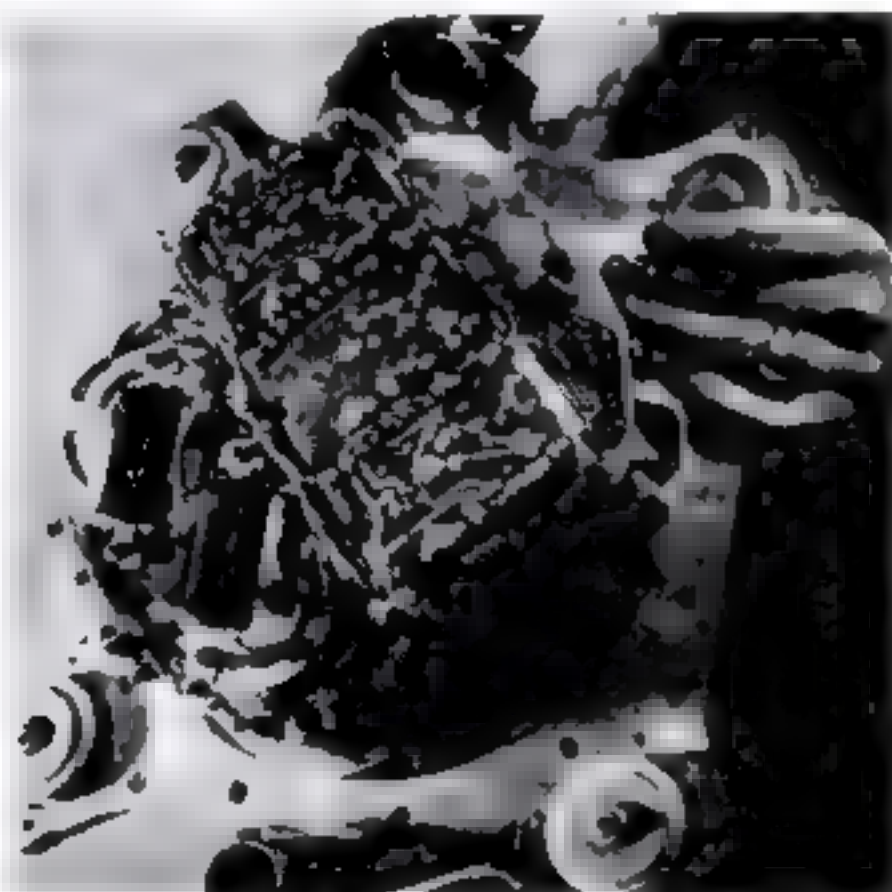
CUTAWAY VIEW of Vanguard launching vehicle shows its three stages and their rocket engines.

In photo at left, GE technicians install X405 first-stage motor for trial in rocket test pit.

By Alden P. Armagnac

WITHIN a few months, a 72-foot rocket vehicle will blast off from Patrick Air Force Base in Florida. Closing the switch that fires it will be the final human act involved in sending up the earth's first artificial satellite—a 20-inch globe of shiny magnesium alloy tucked within the vehicle's nose.

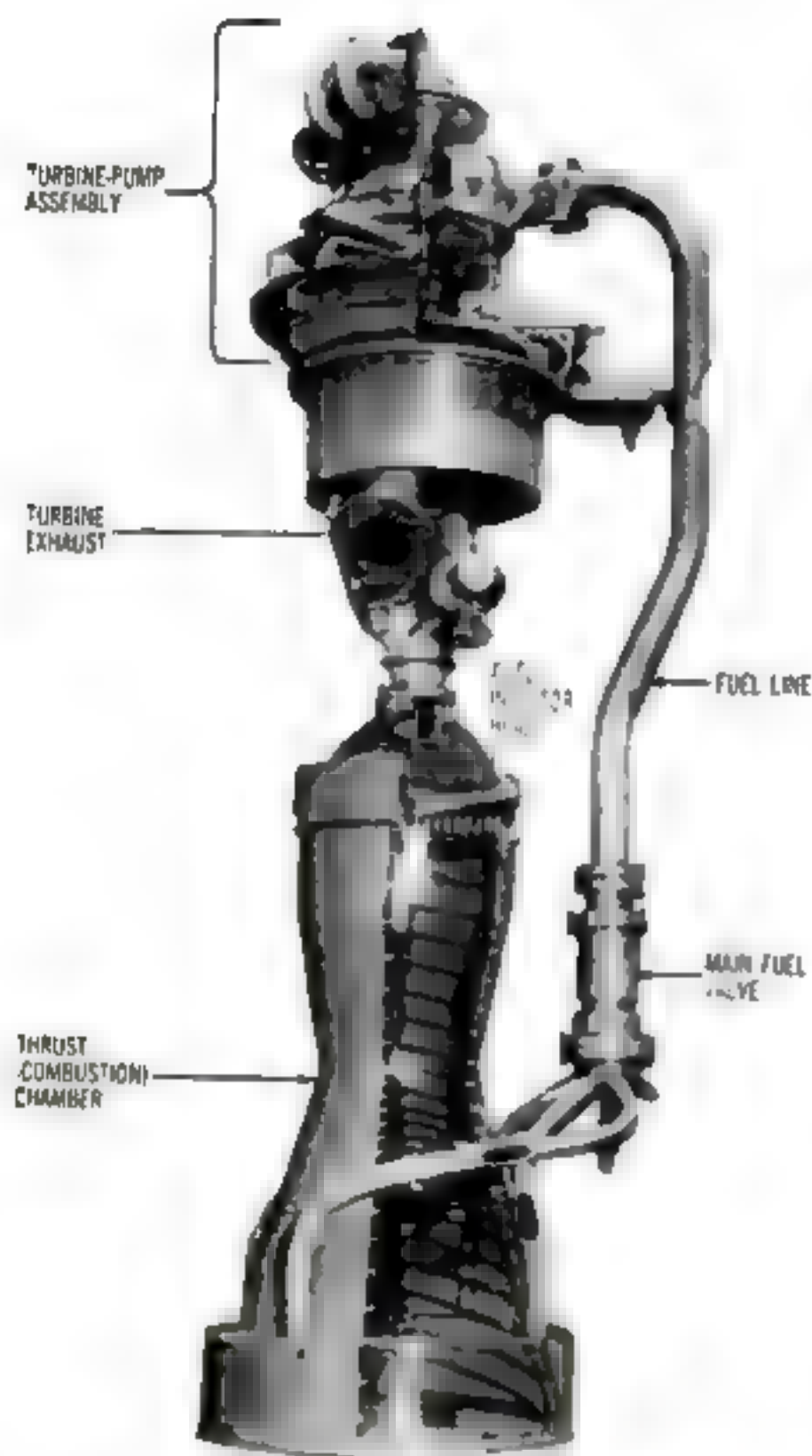
From there on, the fate of man's pioneer attempt to launch a space craft will depend on three mighty rocket motors, and their automatic control system. In 10 drama-packed minutes, if all goes well, the fiery engines will propel the Vanguard launching vehicle to 300-mile altitude, and impart the necessary 18,000-m.p.h. speed to the satellite to sustain it there in an earth-circling orbit. This



ROBOT CAPTAIN of satellite vehicle will be this electronic automaton, preset to carry out control-handling program. It will steer the Vanguard craft on correct course with aid of built-in gyros.



FROM BLOCKHOUSE, observer watches GE's X405 engine put through paces in test pit at Malta, N. Y. This motor will ram the 72-foot ship through virtually all of the atmosphere.



CUTAWAY MODEL of a GE experimental rocket engine, reportedly similar to X405, is believed to show latter's principle. Since X405 is a military development, its details are secret.

is the part each power plant will play:

The first-stage engine, in the 2½ minutes before it's spent and jettisoned, gives the vehicle 36-mile altitude and 4,000-m.p.h. speed. In bulldozer fashion, by brute 27,000-pound force, this General Electric X405 gasoline-and-liquid-oxygen rocket motor rams the missile through more than 99 percent of the atmosphere. Sleek and finless though the Martin-built launching vehicle is, it bucks so much air resistance that its pointed tip may glow red-hot.

Next, the second-stage engine ignites. Developed by Aerojet-General, it burns a liquid hydrazine-family fuel, with fuming nitric acid as an oxidizer. While firing, it boosts the vehicle to 130-mile altitude and 11,000-m.p.h. speed. The big missile then coasts to full 300-mile altitude. Its course, vertical at first, has flattened and by now should be precisely horizontal.

Streaking cometlike from the spent second stage, the vehicle's third stage literally carries the ball—the now-uncovered satellite, mounted at its nose. In miniature, this seven-foot-long rocket forecasts future spaceships, dispensing with streamlining to ply airless voids. A solid-fuel rocket engine of one of two competing designs—being developed by the Grand Central Rocket Co. and by the Allegheny Ballistics Laboratory of

Moon-launching program packs 10 fateful minutes with drama



FROM MOMENT OF TAKEOFF, flame-spouting Vanguard launching vehicle will be on its own, roaring aloft under preset automatic control (1). Above 36-mile altitude and past more than



99 percent of earth's air, it jettisons its spent first stage and also its streamline nose cone, which may be glowing red-hot from speedy passage through atmosphere (2). At 300-mile-



the Hercules Powder Co.—accelerates it to the required orbital speed of 18,000 m.p.h. Now a satellite itself, the rocket releases and launches the metal “moon,” which it may nudge ahead with a spring.

Latest plans add a picturesque sequel. Besides the costly instrumented satellite, the third stage may launch a “Woolworth satellite” of equal or larger size—a self-inflating plastic balloon, coated with aluminum foil, and trailing its more elegant companion as a tag-along moon.

A robot captain commands the Vanguard launching vehicle during ascent. This Minneapolis-Honeywell automaton contains gyros that sense and correct any deviation from the prescribed course. For steering, it actuates a mechanism that tilts the rocket motors of first and second stages in their gimbal mountings. Thus the 11-ton vehicle keeps itself upright, in vertical ascent, much like a baseball bat juggled on a fingertip.

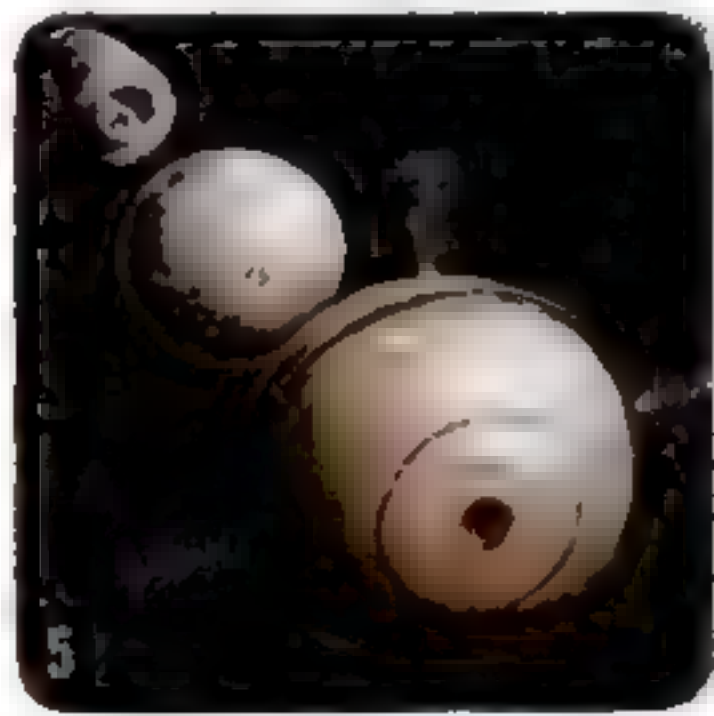
By gradually changing the gyro setting, the robot alters the course from vertical to horizontal. It checks unwanted rolling by turning auxiliary jets on and off. In the same way it sets the second stage spinning, to stabilize it, just before the third stage separates. Beyond that point, the ship of adventure is fully committed and no further control can be applied.

Six satellite-launching attempts, with




THREE-STAGE VANGUARD ROCKET will be tallest, fastest, highest-flying—though less bulky and heavy than some of biggest war-type rockets, as shown above by comparison to scale.

as many Vanguard vehicles, are scheduled before next year's end. Some may fail—for the bold project, barely within reach of today's technology, allows virtually no margin for error, and every smallest valve and tube and relay must work perfectly. Scientists will consider Project Vanguard a success if, as they hope, a half-dozen tries yield them even one or two “good” satellites. **END**



high top of climb, second stage levels off, spins for stability, and releases third stage (3) for final speed dash to 18,000 m.p.h. and launching of metal-ball satellite (4). In addition, in at

least some of the six satellite-launching attempts being planned, third stage may launch a plastic-balloon moon that inflates itself (5) from a tiny cartridge of compressed gas.



60 Days and Nights in an Inferno

WITHIN HOURS after the Akuinu well blew and caught fire, the whole rig had collapsed, and melting muskeg and underground water had formed a boiling, steaming caldron. The photograph on the facing page was taken just after the fire broke out.



When the sub-Arctic's wildest oil-well fire set the frozen earth ablaze, the roughnecks roasted and shivered for two solid months before they finally got it licked.

By Gardner Soule

A "WILD well," oil men have been saying for years, "is nature on the loose." You know what comes next: A story that proves the point.

This year the boys have a new tale that proves it all over again: They light their cigars, and they tell you about the wildest well in Canada's history, and how it blew, and how it caused the meanest fire in Canada's history, and how the best oil firefighters in the business shook their heads, gave up, and walked away.

And how, after two months of struggle, roughnecks put out the fire, which had roasted them while Canada's winter froze them, and how, after the fire, the men escaped just before ground they were walking on turned to oatmeal and water and would have sucked them down.

7:55 a.m., Jan. 16, 1956

"I was in my trailer, 200 feet from the well, when I heard it," says Earl Clark, 33. "A terrific noise like a rifle crack, a jillion times louder. Away she went!"

Akuinu River No. 13-36—a wildcat in the lonesome muskeg wilderness of northern Alberta, near Lesser Slave Lake—had blown wild and caught fire.

Clark, a hazel-eyed former corporal in the Royal Canadian Air Force, knows the story as well as any man alive. He was the geologist on what (everyone thought) was an ordinary wildcat well where oil might, or might not, be found.

"What had happened," he explains, "was this: We were drilling, night and

day, and had reached a depth of 2,720 feet. Just before dawn, without warning, we ran into high-pressure gas. The gas roared out at what, we figured later, was 15 million cubic feet a day—a surprisingly high rate. The jet stream of gas smashed floodlights, and this probably was what set the gas ablaze.

"From then on, the din was terrific. Even when we stood 100 feet from the blaze we had to yell at each other."

The racket, Clark well knew, was the least of the problems the 13 men at Akuinu had on their hands. But he had no idea how many and how fearsome those problems would be. Not many oil men have ever seen, let alone fought, a well as wild as Akuinu 13-36 was to prove itself.

8:00 a.m., Jan. 16

Problem: What about the man last seen at the mouth of the well? Wild wells, oil men tell you, hurl heavy machinery as world champ Parry O'Brien tosses the shot, and spew out 30-foot lengths of pipe as a fizz bottle squirts shaving cream, and have turned hundreds of strong men into cripples and killed hundreds of others.

This, for Earl Clark, was a problem that had a happy answer: For Reuben Stromquist, beneath the derrick (the steel lattice tower over the well) had miraculously escaped injury. Stromquist, who had been directing the bit as it dug the well, wasn't even scratched.

8:03 a.m., Jan. 16

Problem: Could the men cut off the



Aerial view shows road around crater. At one time, gas burst out at right of water tanks.



Roughnecks running drill pipe into relief well worked at temperatures around 30 below zero.



The gas blow died as water filled up porous sand of the gas zone in vicinity of wild well.

jet stream of gas, seal it back into the earth? Solution: Roughneck Paul Weiss and the others jumped to stop the gas flow with the blowout preventer.

A massive thing, the preventer operates by a hydraulic pump to cut off any gas coming up between the pipe in a well and the surface casing (a second coat of steel that surrounds the pipe). First thing the boys had to overcome was frigidity: The thermometer read minus 30, and metal is perverse at that temperature. They applied hot steam to the blowout preventer, got it working.

Seconds later, the heat of the fire struck them in their faces. "It was warm in there," Weiss recalls. The heat boiled the men; then melted ice, snow and mud and bathed them in the resulting slush. But they did stop the gas—then, dripping in the slush, clothes freezing to their skins, they looked for, and quickly found, the next headache.

8:15 a.m., Jan. 16

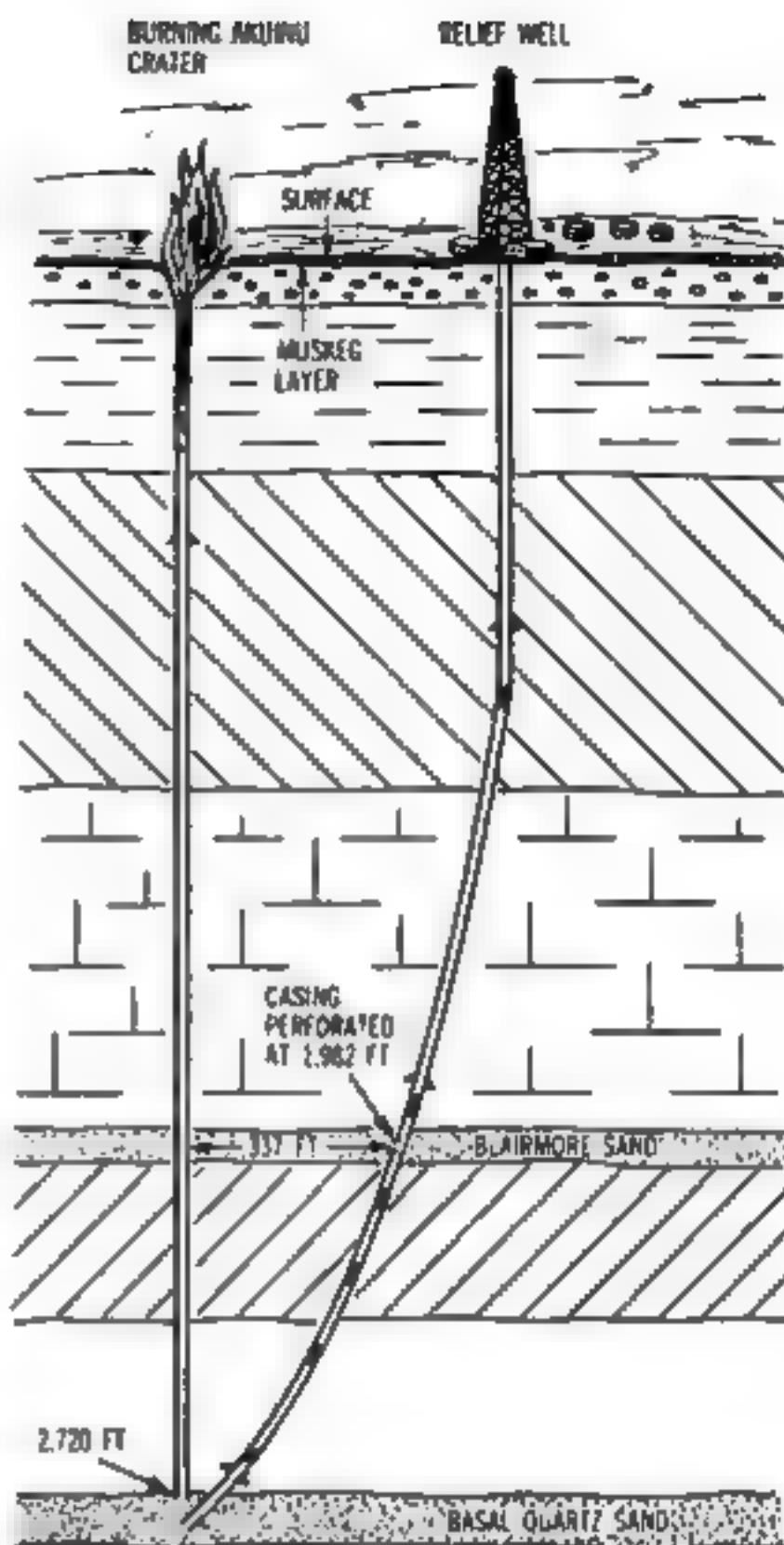
Problem: The wooden housing around the derrick floor had caught fire. Solution: extinguishers.

With these, the lads—they were all typical oil-field workers, age 18 to 30, built like football tackles—put out the housing fire, or almost put it out, by 8:30. All was quiet for half an hour—the only quiet 30 minutes for two months.

9 a.m. to 5 p.m., Jan. 16

The lull was interrupted, and the boys were dismayed, by the sound of gas hissing up again—this time through a mudpit beside the well, where the blowout preventer couldn't possibly cut it off. Suddenly gas exploded again. A blazing well can spray fire over the whole countryside. This one did. It burned down every building on the 10-acre Akunu lease except the boiler house and Clark's trailer.

Then the worst thing happened that can happen to a wild well: It cratered, dug a hole 125 feet long, 60 feet deep. Now escaping gas could find its way to new outlets within the crater and start new fires.



HOW FIRE WAS FINALLY QUENCHED: First theory was that gas flow that caused blowout was coming from basal quartz at a depth of 2,720 feet. Relief well was drilled to reach the original well at this level. When water flooding here failed to stop flow, relief well was plugged back and the casing perforated at Blairmore sand level. This sand proved to be the source of trouble. Although well bores were 337 feet apart at this point, 185,000 barrels of water stopped the gas flow, and the fire finally went out.

This happened. But first the crater became a lake. The fire melted ice and snow and mud. It melted muskeg, a moss-covered bog that turns to water and mush when warm. Muskeg is seven feet deep in the Akunu region and, because of it, oil wells can only be drilled there in winter, when it is frozen solid. The crater filled with water.

Then, as new bursts of gas came belching through earth and water, there were flaming, 30-foot-high hurricane waves

[Continued on page 244]

How They Make Fish Hooks



BIGGEST problem with fish hooks, besides rust, is getting the right temper. Make them hard enough to hold a long-lasting sharp point and withstand bending, and they're liable to break at the barb. Make them soft so the barb won't break, and the point will soon lose its sharpness and can be bent easily.

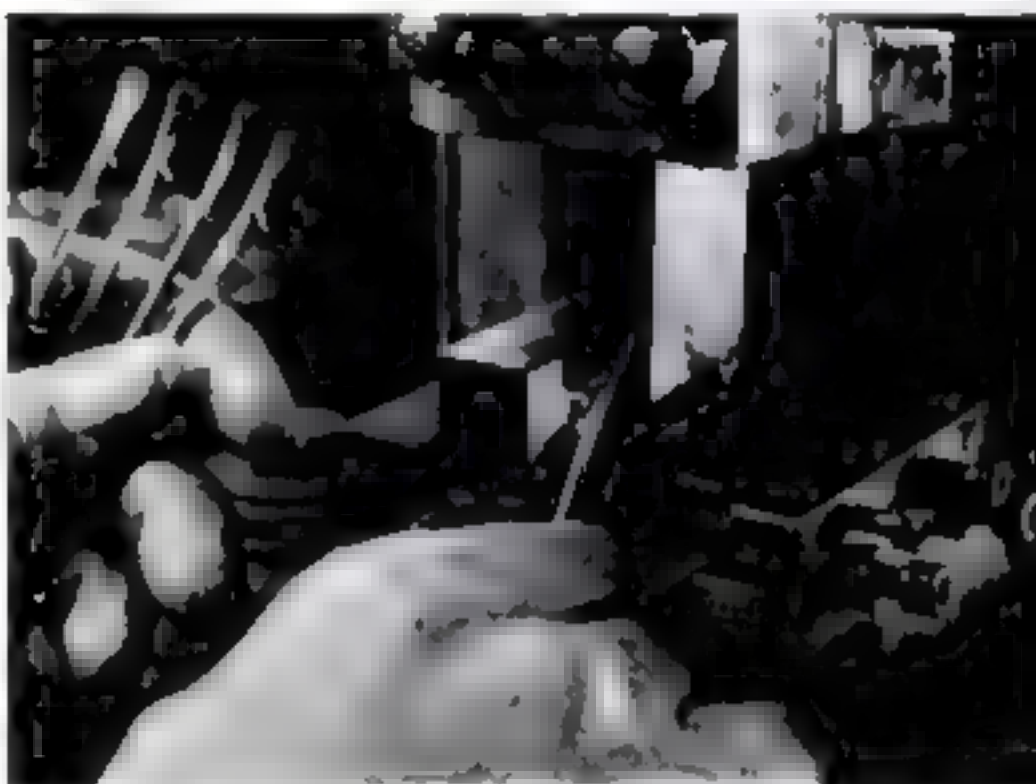
One man who seems to have mastered the ticklish business of heat-treating fish hooks is Fred Miller of San Francisco who, with only five employees, will turn out 1,500,000 fish hooks this year—all smooth and precisely bent, with dagger-like points. "The kind that fishermen like to feel with their thumb and forefinger," says Miller.

Instead of steel, he uses a special alloy of rustproof nickel wire called Dura-nickel, 93.7 percent nickel with traces of copper, manganese, aluminum and iron. Fishermen can throw these hooks into their tackle boxes at the end of a day without bothering to dry them off.

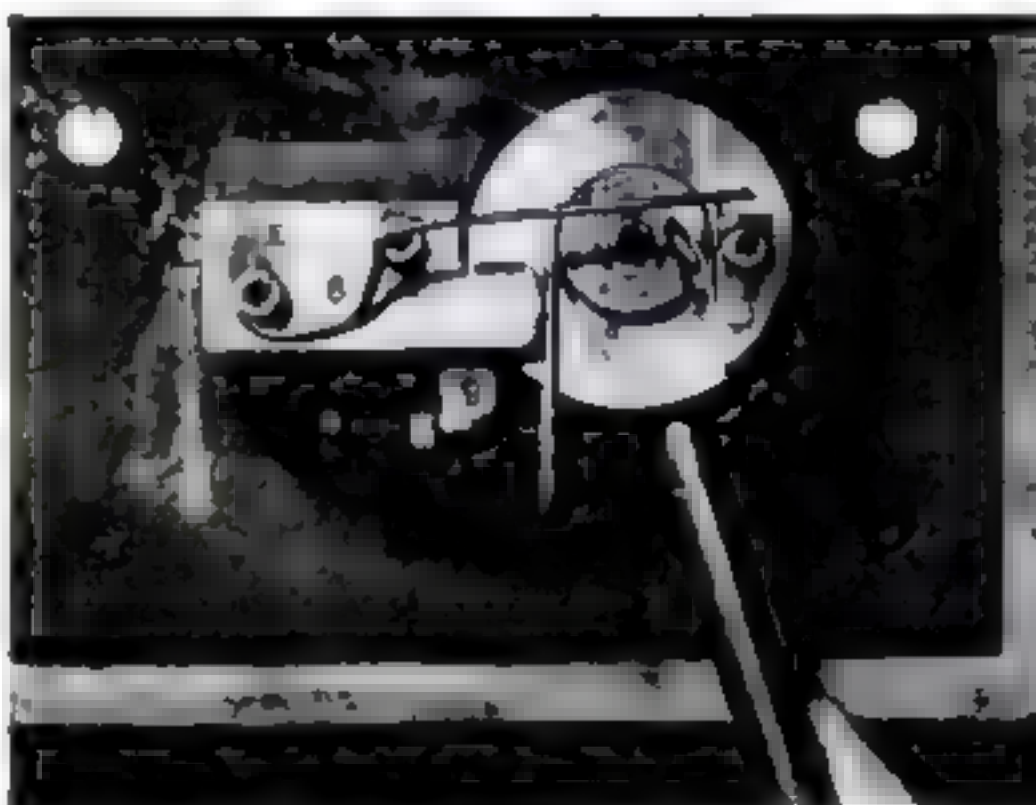
Miller makes hooks of all sizes and lengths, from marlin and albacore grapplers to dainty trout hooks for stream sportsmen. He gets orders for as many as 150,000 at a time, from places that are as far away as the Philippine Islands. —Hal Roth.



1 RAW MATERIAL: Wire for the fish hooks comes to Miller's plant in paper-wrapped coils that weigh from 350 to 400 pounds. It runs from .045" to .131", costs about \$1.65 a pound.



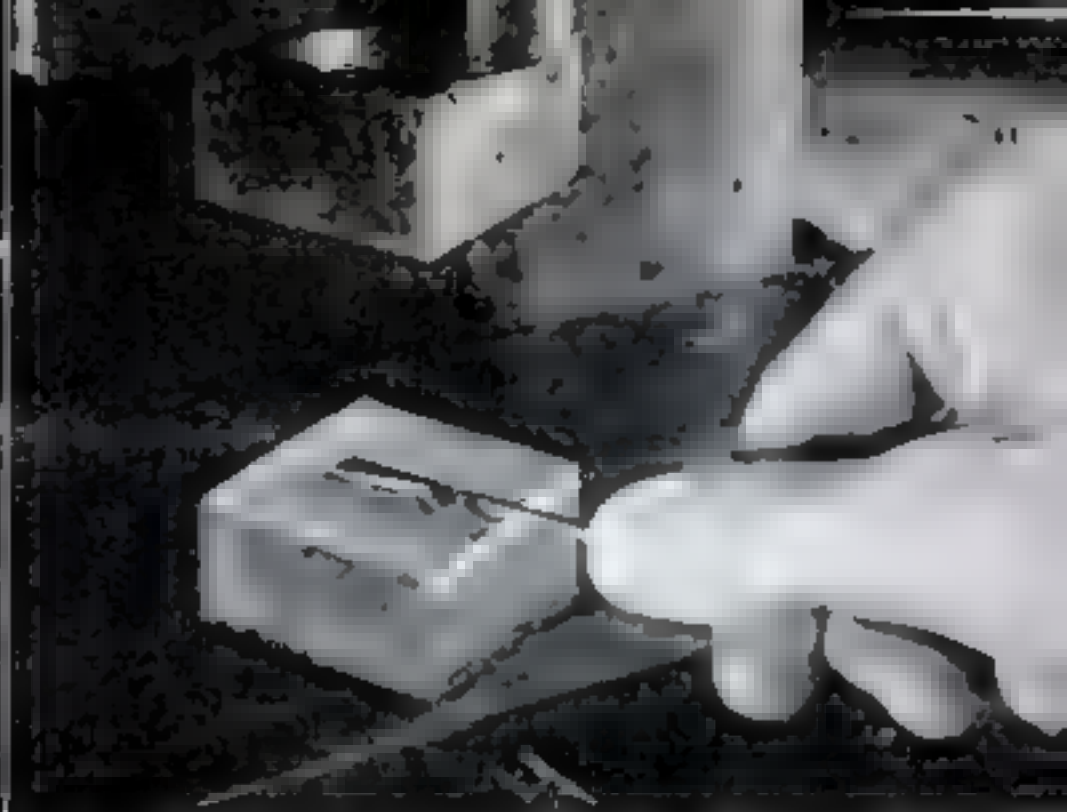
4 FOUR-TON PRESS punches out the points after the hook ends have been forged. The point, curved at this stage, will be checked with a jig to make sure that it's just right.



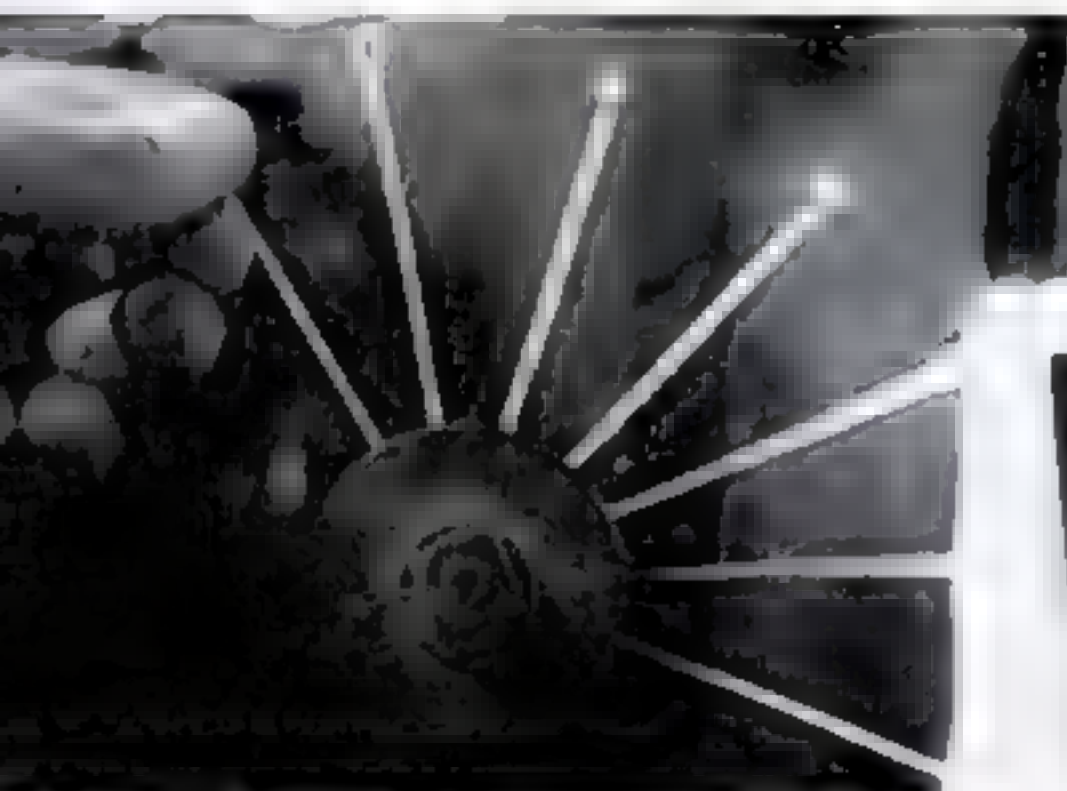
7 HOOK IS SENT to shape over a die. The barb fits into a notch and the wire is rolled around the die, which revolves clockwise. This is a speedy operation: 1,000 hooks an hour.



2 AFTER WIRE IS UNCOILED, cut to length, and the eyes bent, each hook is run through this four-ton stamp press, which notches out the barb. Operator can process 300 hooks an hour



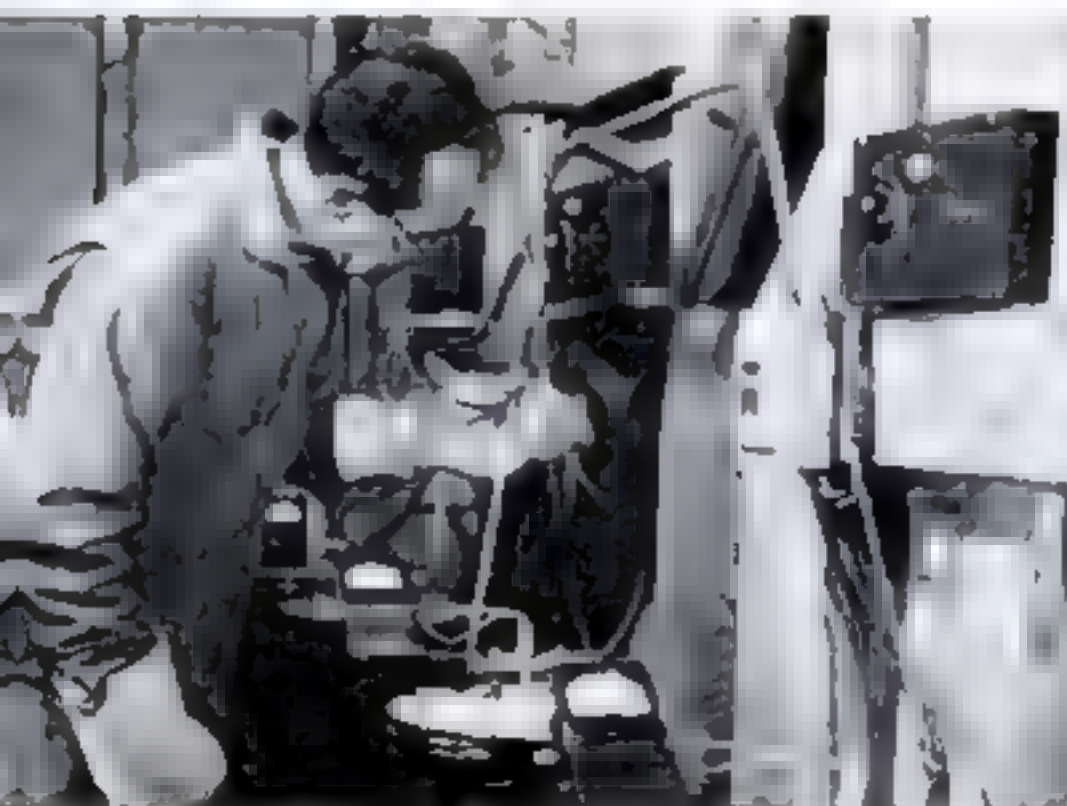
3 FLAT FOR THE HOLLOW-GROUND POINT is forged in a 30-ton punch press. If the hook were merely sharpened, not flattened and hollow-ground, the point would soon be gone.



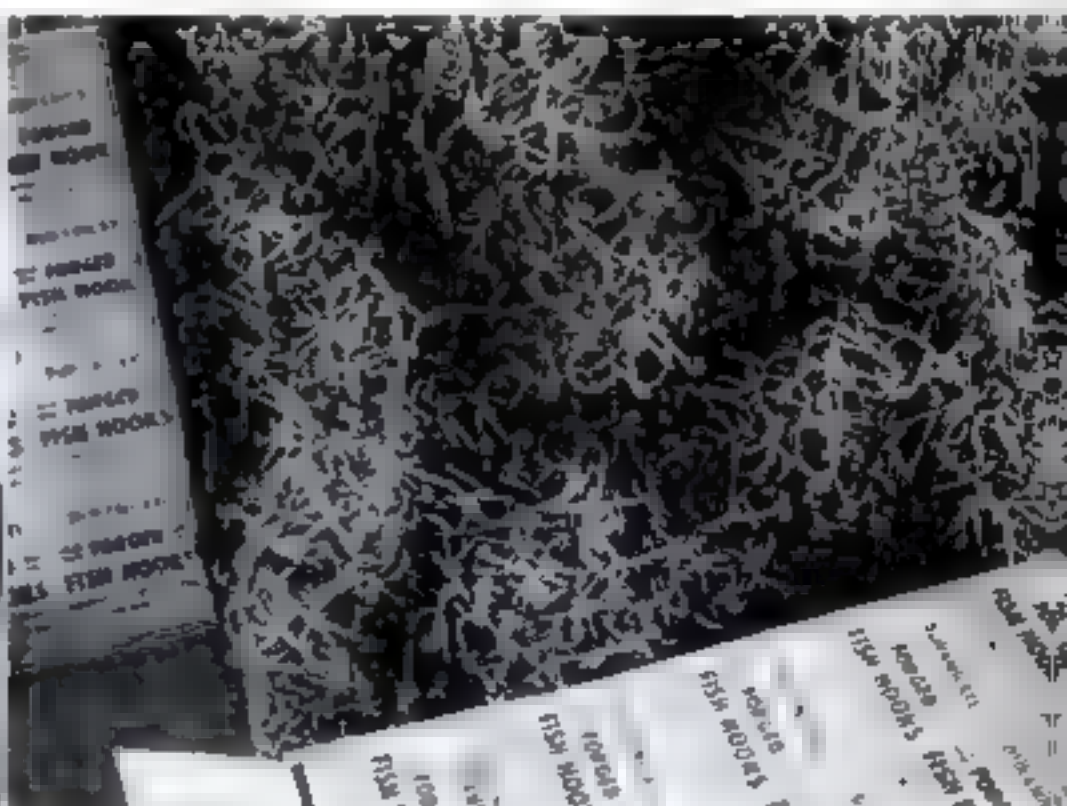
5 PINWHEEL SETUP anneals the hook eyes so they'll stand opening and closing later. Inserted (left), they ride through the flame and drop out into a bucket of cooling water.



6 FINISH-GRINDING and polishing are done on this high-speed emery belt—six of which are used up every day. Before points get here, they are rough-ground on an abrasive wheel.



8 HEAT-TREATING takes place after all forming operations have been completed. Here Fred Miller checks the temperature of a batch of hooks ready to come out of the ovens.



9 FINALLY, the hooks are bathed in muriatic acid to remove the scale, tumbled to make them bright, and packaged by weight—approximately 100 hooks to the box.

END

New Outboards:

Taking out after their auto big brothers, the 1957 models are competing both in horsepower and flashy looks. But there's also some ingenious engineering under the bright-colored housings.



Mercury packs 60 hp. into big Mark 75.

THE horsepower race is on with outboards, too. Johnson and Evinrude have upped their top 1957 engines from 30 to 35 hp. and their next-in-line models from 15 to 18 hp. Scott-Atwater has boosted its biggest mill from 33 to 40 hp. Leading the pack is Mercury.

Last year, when most manufacturers were content with 30 hp., Mercury was turning out a 40-hp. four. This year, Mercury introduced a 60-hp. six, the largest outboard ever produced in this country for pleasure use and by a major company. (Riley, a small West Coast outfit, used to make a 75-hp. unit; during the last World War and for a short time afterward, Evinrude turned out a 50.)

Another entry in the big-engine class is the four-cylinder Fageol 44, introduced in the middle of last season. A four-cycle job, this is sold as a regular outboard, as a V-drive inboard, and as a vertical inboard-outboard combination. In the latter form the motor is inboard, driving an outboard-type power unit via bevel gears. Fageol claims that an owner

can convert his craft into an inboard with just a bit, brace and screwdriver.

Except for Mercury's whopper, most of this year's power boost has come from jazzing up earlier engine blocks. Displacement was raised on the Johnsons and Evinrudes, and Scott-Atwater got its extra horses primarily by using a different wheel, letting r.p.m. go to 5,000, instead of 4,200, at the rated horsepower.

Horsepower hassle. For years the Outboard Boating Club of America, which attests to power outputs of products of member companies, rated motors at 4,000 r.p.m., or even less. Since in use most mills were allowed to rev up a good deal faster, power claims were generally conservative. In the 1940s, the Kiekhaefer Company (maker of Mercury) was breaking into the field, and underrated its engines more than anyone else. Word soon got around that a 10-hp. Merc, for example, would outrun a 10-hp. anything 10 days for Sunday. Some companies kicked, but there was nothing they could do because Kiekhaefer calmly



Johnson's generator lights your boat.

Words you'll be hearing more: "Pull over to the side!"

THE water isn't going to be cop-free much longer. Every year more localities are passing legislation to control water traffic. Several states,

including New Hampshire, New Jersey, New York and Pennsylvania, already require licenses for boats operated above tidal waters—the tidal waters themselves are under Federal jurisdiction. On the basis of testimony and recommendations heard at its extended hearings, Congress is ex-

High Power, High Style

By David R. Lindsay



Scott-Atwater offers choice of colors.

stayed out of reach—out of the O.B.C., that is. There was nothing more or less scientific about Mercury's figures; the difference was simply in the speed at which the output was measured. The American Power Boat Association, principal race sponsor, has long recognized the slipperiness of horsepower ratings; A.P.B.A. defines its classes by displacement instead.

Anyway, O.B.C. has relaxed its r.p.m. rules. As the specification table on pages 136-137 shows, many motors are now rated at 4,500 or even 5,000. Mercury, still not in O.B.C., rates its engines at 5,800, their recommended top for ordinary service. (In racing, of course, they're wound up a lot more; one racing driver says he's seen Mercs revved above 10,000.)

Racing mills. Kiekhaefer is the only big company today turning out stock competition motors. It has the Mark 30 H (29.7 cu. in.) in the 30-inch Class C and the Mark 55 H (39.6 cu. in.) in the 40-inch Class D. The only other stock racing engine on the market is the Champion Hot Rod (19.94 cu. in.), raced in 20-inch Class B. (As a very rough translation factor, estimate one horse per cubic inch.)



Evinrude's costliest is electric Lark.

The new Mercury giant has a displacement of 59.4 cubic inches; a competition version could be raced in Class F (60 cu. in.). Racing is simply a matter of prestige for Kiekhaefer and Champion; too few competition motors are sold to make much of a market. There are less than 4,500 registered stock outboard racers out of some 5.5 million outboard boats and motors.

All motor and a mile high. The new high-standing Merc is called the Mark 75, although the name has no more meaning than the jet-propelled tags given new cars. Without a single sand-casting, the big baby is a triumph of the art of die-casting, which has resulted in great weight savings in almost all outboards. A vertical, in-line six, the Mark 75 has three carburetors and two separate ignition systems. It has a reverse but no shift, which calls for a unique ignition setup.

Unlike the magneto spark used on most outboards, this one has a battery-coil-distributor arrangement, as in an auto. There is a separate coil and condenser for each set of three cylinders, although a single rotor running past two sets of points does the distributing. The

pected to pass a new Federal licensing or boating-control law this spring. Witnesses at the hearings had many things to complain of. These included: speeding in crowded waters, operating boats through or near swimming areas, drivers of ski-tow boats watching their water skiers in-

stead of where they were going, and hot-rodding in general. Many lakes, of course, have had horsepower limits of their own, but the situation is now considered so dangerous by many officials that they want a really strict set of rules for waters being used by motor boats.

generator is a brushless alternator, which charges the battery through a rectifier that converts the AC into DC.

This giant outboard has only a single remote-control handle besides the steering wheel. The handle controls both throttle and distributor, which are inter-

connected. A button on the handle's end runs the 12-volt electric starter.

To start going forward, you put the lever in the forward position and push the button. The engine is in gear as it begins firing, but it idles at a low 400 r.p.m., equivalent to under one m.p.h.,

1957 OUTBOARD SPECS		Horsepower (at 1,800)	No. of Cyls.	Stroke & Throw (inches)	Displacement (cubic inches)	Revs. per minute	Starting (manual or electric)	Fuel Tank		Engine Weight (pounds)	List Price
Make	Model							Capacity (gallons)	Type (integral or removable)		
BUCCANEER	3-hp. Deluxe	3 @ 4,000	1	2-1/8 x 1-1/2	5.32	plv.	man.	1/2	int.	32	\$135.00
	5-hp. Standard	5 @ 4,000	1	2-15/16 x 1-1/2	8.84	plv.	man.	4/5	int.	44.5	\$182.50
	5-hp. Deluxe	5 @ 4,000	1	2-15/16 x 1-1/2	8.84	gear.	man.	4/5	int.	52	\$215.00
	12-hp. Standard	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	man.	2	int.	69.5	\$325.00
	12-hp. Deluxe	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	man.	2	rem.	77.5	\$360.00
	12-hp. Electric	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	elec.	6	rem.	86.5	\$440.00
	25-hp. Deluxe	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	man.	6	rem.	118.5	\$465.00
	25-hp. Electric	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	elec.	6	rem.	130	\$545.00
CHAMPION	2N Guide Four	4.2 @ 4,300	1	2-1/16 x 1-3/4	8.84	plv.	man.	1-1/4	int.	42	\$179.00
	3N-S Guide Six	6 @ 4,300	1	1-7/8 x 1-3/4	9.46	gear.	man.	1-1/4	int.	46	\$233.00
	4N-D Superior "16"	7.4 @ 4,300	1	1-7/8 x 1-3/4	9.46	gear.	man.	3-1/2	int.	46	\$285.00
	6N-D Sweet "16"	16.5 @ 4,300	2	2-1/2 x 2-1/32	19.94	gear.	man.	6	rem.	54	\$387.00
	6N-MS Mid-Ship	(same engine as above but fitted for entirely remote control)									\$376.00
	6N-HR Hot-Rod	not available	2	2-1/2 x 2-1/32	19.94	none	man.	2	rem.	46	\$450.00
CONTINENTAL	Sport	2.5 @ 3,750	1	1-5/8 x 1-5/8	5.05	plv.	man.	5/8	int.	23	\$ 78.95 \$ 89.95 as kit
ELGIN	5922 A	2 @ 4,000	1	1-3/4 x 1-9/16	3.78	plv.	man.	7/8	int.	28	\$ 98.95
	5952	5.5 @ 4,000	2	2 x 1-11/16	10.40	gear.	man.	4-1/2	rem.	56	\$204.85
	5972	7.5 @ 4,000	2	2-1/8 x 1-11/16	11.97	gear.	man.	4-1/2	rem.	56	\$219.95
	5994	12 @ 4,000	2	2-3/8 x 2	17.72	gear.	man.	6	rem.	61	\$289.95
	5942	30 @ 4,200	2	3 x 2-23/32	38.26	gear.	man.	6	rem.	118	\$419.95
	5962	30 @ 4,200	2	3 x 2-23/32	38.26	gear.	elec.	6	rem.	126	\$484.95
	5980	30 @ 4,200	2	3 x 2-23/32	38.26	gear.	elec.	6	rem.	130	\$489.95
ELTO	3	3 @ 4,000	1	2-1/8 x 1-1/2	5.32	plv.	man.	2/8	int.	30	\$145.00
	5	5 @ 4,000	2	1-15/16 x 1-1/2	8.84	gear.	man.	3/4	int.	52	\$230.00
	12	12 @ 4,000	2	2-1/4 x 2-1/8	17.89	gear.	man.	5	rem.	75	\$387.00
	25	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	man.	6	rem.	119	\$465.00
	25 Electric	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	elec.	6	rem.	129	\$595.00
EVINRUDE	Lightwin	3 @ 4,000	2	1-9/16 x 1-3/8	5.28	plv.	man.	7/10	int.	33	\$155.00
	Fisherman	5.5 @ 4,000	2	1-15/16 x 1-1/2	8.84	gear.	man.	4-1/2	rem.	56	\$230.00
	Fleetwin	7.5 @ 4,000	2	2-1/8 x 1-3/4	12.4	gear.	man.	4-1/2	rem.	59	\$260.00
	Sportwin	10 @ 4,000	2	2-3/8 x 1-7/8	16.6	gear.	man.	6	rem.	74	\$340.00
	Fastwin Standard	18 @ 4,500	2	2-1/2 x 2-1/4	22.0	gear.	man.	6	rem.	80	\$395.00
	Fastwin Electric	18 @ 4,500	2	2-1/2 x 2-1/4	22.0	gear.	elec.	6	rem.	87	\$475.00
	Big Twin Standard	25 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	man.	6	rem.	123	\$495.00
	Big Twin Electric	25 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	elec.	6	rem.	129	\$585.00
	Lark Electric	35 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	elec.	6	rem.	132	\$625.00
PAGEOL	Pageol 44 (4-cycle)	35 @ 5,200	4	2-1/2 x 2-1/4	44.0	gear.	elec.	6-1/2	rem.	190	\$828.00
FIRESTONE	3-hp.	2.6 @ 4,000	1	2-1/8 x 1-3/4	6.21	plv.	man.	1	int.	34	\$118.95
	5-hp.	5 @ 4,200	2	1-11/16 x 1-11/16	7.48	gear.	man.	3-1/2	rem.	42	\$215.00
	10-hp.	10 @ 4,200	2	2-11/16 x 2	14.82	gear.	man.	6	rem.	59	\$320.00
	16-hp.	16 @ 4,200	2	2-11/16 x 2-5/16	19.95	gear.	man.	6	rem.	68	\$362.00
	25-hp.	25 @ 4,800	2	3-1/16 x 2-3/4	40.51	gear.	man.	6	rem.	117	\$468.95
	35-hp.	35 @ 4,800	2	3-1/16 x 2-3/4	40.51	gear.	elec.	6	rem.	127	\$558.95
JOHNSON	Sea-Horse 3	3 @ 4,000	2	1-9/16 x 1-3/8	5.28	plv.	man.	7	int.	33.25	\$155.00
	Sea-Horse 5-1/2	5.5 @ 4,000	2	1-15/16 x 1-1/2	8.84	gear.	man.	4-1/2	rem.	56	\$230.00
	Sea-Horse 7-1/2	7.5 @ 4,000	2	2-1/8 x 1-3/4	12.4	gear.	man.	4-1/2	rem.	59	\$260.00
	Sea-Horse 10	10 @ 4,000	2	2-3/8 x 1-7/8	16.6	gear.	man.	6	rem.	72.5	\$340.00
	Sea-Horse 18	18 @ 4,500	2	2-1/2 x 2-1/4	22.0	gear.	man.	6	rem.	77	\$385.00
	Sea-Horse 18	18 @ 4,500	2	2-1/2 x 2-1/4	22.0	gear.	elec.	6	rem.	87	\$475.00
	Sea-Horse 25	25 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	man.	6	rem.	123	\$495.00
	Sea-Horse 35	35 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	elec.	6	rem.	134	\$585.00
	Golden Javelin	35 @ 4,500	2	3-1/16 x 2-3/4	40.5	gear.	elec.	6	rem.	138	\$625.00
MAJESTIC	M-2N Fisherman Spec	4.2 @ 4,300	1	2-1/16 x 1-3/4	8.84	plv.	man.	1-1/4	int.	42	\$179.00
	M-3N-GS	6 @ 4,300	2	1-7/8 x 1-3/4	9.56	gear.	man.	1-1/4	int.	46	\$233.00
	M-4N-GS	7.4 @ 4,300	2	1-7/8 x 1-3/4	9.56	gear.	man.	3-1/2	int.	47	\$249.00
	M-6N-GS	15 @ 4,300	2	2-1/2 x 2-1/32	19.94	gear.	man.	6	rem.	54	\$355.00

Outboard game of Who's Who

IN THE table on this and the next page are listed 19 brand names, but there are by no means 19 manufacturers left in the industry. Johnson and Evinrude, whose motors are made in different plants but to the same basic designs and

specifications (except for decoration), are both part of Outboard Marine Corp. So are Gale, Elto (the Canadian subsidiary), Sea-Bee and Sea King. These last four brands are all basically alike. Champion, a relatively small outfit, makes Majestic and Voyager motors; Scott-Atwater makes Firestone; Mercury makes Wizard; and

the manufacturer says. To accelerate, you push the handle ahead. This advances the spark (by turning the distributor) until the optimum position is reached. Subsequent additional speed comes from the throttle alone.

Dead and revived for reverse. To go

astern you move the handle back to off, which stops the engine entirely. Then you pull it back still further and push the button to start in reverse. Like most two-cycle engines, the Mark 73 can be run in either rotation. Pulling back on the control turns the distributor to the

MAKE	MODEL	HORSEPOWER (at 1,800 r.p.m.)	NO. OF CYCLES	BORE & STROKE (inches)	DISPLACEMENT (cubic inches)	REVERSE (piv. or gear)	STARTING (manual or electric)	CAPACITY (gallons)	TYPE (integral or remote)	ENGINE WEIGHT (pounds)	PRICE
MERCURY	Mark 6	5.5 @ 5,000	2	1-3/4 x 1-1/2	7.2	piv.	man.	3-1/4	rem.	42	\$279.50
	Mark 10 Tri-Tide	10 @ 5,000	2	2-11/32 x 2-1/8	18.5	gear	man.	6	rem.	88	\$350.00
	Mark 25	20 @ 5,800	2	2-7/16 x 2-1/8	19.8	gear.	man.	6	rem.	75	\$401.00
	Mark 25E	20 @ 5,800	2	2-7/16 x 2-1/8	19.8	gear.	elec.	6	rem.	85	\$490.85
	Mark 30	30 @ 5,800	2	2-7/16 x 2-1/8	29.7	gear.	man.	6	rem.	110	\$485.50
	Mark 30 E	30 @ 5,800	2	2-7/16 x 2-1/8	29.7	gear.	elec.	6	rem.	118	\$510.50
	Mark 30 H	30 @ 5,800	2	2-7/16 x 2-1/8	29.7	none	man.	6	rem.	not avail.	\$550.00
	Mark 55	40 @ 5,800	4	2-7/16 x 2-1/8	39.6	gear.	man.	6	rem.	111	\$652.00
	Mark 55 E	40 @ 5,800	4	2-7/16 x 2-1/8	39.6	gear.	elec.	6	rem.	120	\$757.00
	Mark 55 H	40 @ 5,800	4	2-7/16 x 2-1/8	39.6	none	man.	6	rem.	not avail.	\$850.00
MERCURY	Mark 75	60 @ 5,300	6	2-7/16 x 2-1/8	58.4	single control	elec.	6	rem.	168	\$982.00
	Mark 75 H	60 @ 5,300	6	2-7/16 x 2-1/8	58.4	single control	elec.	6	rem.	not avail.	not avail.
NEPTUNE	Mighty Mite	1.7 @ 4,000	1	1-4/16 x 1-1/2	3.0	none	man.	1/4	int.	17	\$ 88.50
OLIVER	Model 6	6 @ 4,000	2	2-1/2 x 1-1/2	9.42	gear	man.	3-1/2	rem.	50	\$220.00
	Standard 16	16 @ 4,500	2	2-1/2 x 2-1/32	19.94	gear.	man.	6	rem.	79	\$370.00
	Deluxe 16	16 @ 4,500	2	2-1/2 x 2-1/32	19.94	gear.	elec.	6	rem.	not avail.	\$470.00
	Olympus 35	35 @ 4,700	2	3-1/16 x 2-7/8	42.35	gear	elec.	6	rem.	125	\$610.00
SCOTT-ATWATER	3.6	3.6 @ 4,000	1	2-1/8 x 1-3/4	6.23	none	man.	1	int.	36	\$119.50
	5	5 @ 4,200	2	1-11/16 x 1-11/16	7.48	gear	man.	3-1/2	rem.	45	\$225.00
	7-1/2	7.5 @ 4,200	2	2 x 1-3/4	11.8	gear.	man.	6	rem.	84	\$250.00
	10	10 @ 4,700	2	2-11/16 x 2	14.62	gear.	man.	6	rem.	82	\$330.00
	Recoil 16	16 @ 4,700	2	2-11/32 x 2-5/16	19.95	gear.	man.	6	rem.	75	\$372.00
	Electric 16	16 @ 4,700	2	2-11/32 x 2-5/16	19.95	gear.	elec.	6	rem.	85	\$482.00
	Recoil 40	40 @ 5,000	2	3-1/8 x 2-3/4	42.18	gear.	man.	6	rem.	133	\$489.50
	Electric 40	40 @ 5,000	2	3-1/8 x 2-3/4	42.18	gear.	elec.	6	rem.	148	\$589.50
	Royal Scott	40 @ 5,000	2	3-1/8 x 2-3/4	42.18	gear.	elec.	6	rem.	145	\$675.00
SEA-BEE	3-hp. Deluxe	3 @ 4,000	1	2-1/8 x 1-1/2	5.32	piv.	man.	1/2	int.	30	\$134.95
	5-hp. Standard	5 @ 4,000	2	1-15/16 x 1-1/2	8.84	piv.	man.	4/5	int.	45	\$182.50
	5-hp. Deluxe	5 @ 4,000	2	1-15/16 x 1-1/2	8.84	piv.	man.	4/5	int.	52	\$214.95
	12-hp. Deluxe	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	man.	6	rem.	75	\$359.95
	25-hp. Deluxe	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	man.	6	rem.	119	\$484.95
	25-hp. Del. El.	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	elec.	6	rem.	130	\$564.00
SEA KING	3-hp. Deluxe	3 @ 4,000	1	2-1/8 x 1-1/2	5.32	piv.	man.	1/2	int.	32	\$105.00
	5-hp. Standard	5 @ 4,000	2	1-15/16 x 1-1/2	8.84	piv.	man.	4/5	int.	48.5	not avail.
	5-hp. Deluxe	5 @ 4,000	2	1-15/16 x 1-1/2	8.84	gear.	man.	4/5	int.	52	not avail.
	12-hp. Standard	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	man.	2	int.	68.5	not avail.
	12-hp. Deluxe	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	man.	6	rem.	77.5	not avail.
	12-hp. Electric	12 @ 4,000	2	2-1/4 x 2-1/4	17.89	gear.	elec.	6	rem.	86.5	not avail.
	25-hp. Manual	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	man.	6	rem.	119	not avail.
	25-hp. Deluxe Electric	25 @ 4,000	2	2-7/8 x 2-3/4	35.7	gear.	elec.	6	rem.	130	not avail.
VOYAGER	V-2N Fisherman Special	4.2 @ 4,300	1	2-1/16 x 1-3/4	5.84	piv.	man.	1-1/4	int.	42	\$179.00
	V-3N-CS	6 @ 4,300	2	1-7/8 x 1-3/4	9.68	gear	man.	1 1/4	int.	46	\$233.00
	V-4N-CS	7.8 @ 4,300	2	1-7/8 x 1-3/4	9.68	gear	man.	2-1/2	int.	47	\$249.00
	V-6N-CS	15 @ 4,300	2	2-1/2 x 2-1/32	19.94	gear	man.	6	rem.	54	\$355.00
WEST BEND	2-hp. Shrimp A	2 @ 4,000	1	1-3/4 x 1-9/16	3.76	piv.	man.	7/8	int.	28	\$135.00
	6-hp. Pike	6 @ 4,500	2	2 x 1-11/16	10.80	gear	man.	4-1/2	rem.	58	\$245.00
	8-hp. Musher	8 @ 4,500	2	2-1/8 x 1-11/16	11.97	gear	man.	4-1/2	rem.	58	\$265.00
	12-hp. Barracuda	12 @ 4,000	2	2-3/8 x 2	17.72	gear	man.	6	rem.	61	\$365.00
	30-hp. Shark	30 @ 4,000	2	3 x 2-11/16	38.26	gear	man.	6	rem.	114	\$490.00
	30-hp. Shark Electric	30 @ 4,000	2	3 x 2-11/16	38.26	gear.	elec.	6	rem.	126	\$550.00
	30-hp. Shark Generator	30 @ 4,000	2	3 x 2-11/16	38.26	gear.	elec.	6	rem.	127	\$580.00
WIZARD	Super 5	5 @ 4,000	2	1-3/4 x 1-1/2	7.2	gear	man.	3-1/4	rem.	42	\$159.50
	Super 10	10 @ 4,000	2	2-7/16 x 2-1/8	19.8	gear.	man.	6	rem.	82	\$229.50
	Powermatic 12	12 @ 4,000	2	2-7/16 x 2-1/8	19.8	gear.	man.	6	rem.	72	\$299.50
	Super Power 25	25 @ 5,000	4	2-7/16 x 2-1/8	29.78	gear.	man.	6	rem.	106	\$399.50
	Super Power 25	25 @ 5,000	4	2-7/16 x 2-1/8	29.78	gear.	elec.	6	rem.	114	\$449.50

From 1957 Boats, by David R. Lindsay, Dell Publishing Co., Inc.

West Bend makes Elgin. Prices are not always as alike as the motors—this is one of the factors to consider when you're comparing what you would like to have with what your wallet can stand.

Just in case you care about sales, Evinrude is reputed to be the leader in the field. ("Re-

puted" because sales figures aren't made public, but people in the business like to gossip.) Johnson and Mercury run a close race for next place, with Scott-Atwater following them. When you look closely and count in all the brands, Outboard Marine controls the lion's share of the whole business.

Tips on water and gas—to keep your engine healthy

Most manufacturers talk very little these days about two points they used to stress: flushing out engines operated in salt water and burning only unleaded or white gas. The flushing has had to be pretty much passed because many engines are now so heavy that they have to be left on boats most of the time. As a solution for this problem, manufacturers have worked hard to improve corrosion resistance. But if you run your motor in salt water, at least tilt the motor up so the lower unit is clear of the briny when the boat is idle. And when you haul it out to hiber-

nate until next season, a good flushing of the cooling system with a fresh-water hose (or running it for a while in a tank of fresh water) will do wonders for the engine's life.

As to gas, the white kind is still the best for two-cycle motors. Reason: The leaded type, used in cars, tends to build deposits that may partially or wholly short out the spark plugs. Most outboards require more plug changing than any other form of servicing, so don't make matters worse if you can help it. Good news: more white gas is available at outboard boating centers.

proper run-backwards setting. It also moves a lever locking the motor so it won't climb up out of the water in reverse. To go from forward to reverse, including stopping the engine and starting again, takes a second or so.

Another feature on the Mark 75 is its exhaust, which comes out through the propeller hub. According to the drawing-board experts, the gases are thrown much farther back from the boat.

What's next? Just in case the boys at Johnson, Evinrude and Scott-Atwater aren't needled enough by the Mark 75, Mercury engineers are toying with an even bigger power plant. (There are also rumors of a non-piston engine in the trade.) Where it will all end, only the manufacturers of small dock cranes for lifting the engines can say. Although the Mark 75 weighs only about a third of what a comparable inboard might—168 pounds compared to 450 to 500—it costs more than some inboards producing greater power at lower r.p.m.

On the other hand, the public likes big outboards. Dealers report that small engines are taking a dwindling share of the market.

Other developments. The Forward Look (Hi, there, Chrysler!) has hit outboards, too. In the smaller-engine field, Mercury brought out one wholly new small engine, the Mark 10, which has a high-style lean. This follows a development started in 1956 by Johnson and Evinrude with their three-hp. motors. The purpose is to have the propeller stick out behind the boat, with the shaft at an angle and the lower unit sub-

merged less than formerly. The combination of slope and limited draft makes it easier to live with snags and sand bars.

Slip clutches have now definitely taken over from shear pins. All Mercury, Johnson and Evinrude motors have them, and all but one Scott-Atwater. They consist of rubber or neoprene sleeves inside the propeller hub. When the wheel hits an obstruction, the sleeve keeps turning; once the obstacle is past, the assembly turns again. Result: no need to carry extra shear pins. This is more than just an end to an annoyance. On today's motors, which may be too heavy to be lifted into a boat, changing a shear pin would be a job for a long-armed contortionist or a water walker.

This year almost all motors have shifted to 12-volt starting. Generators, which are included or are optional with several motors, aren't really necessary if batteries are used solely for starting, since an occasional charge on shore will pick them up. On outboard cruisers with electric-lighting systems, however, they are a boon.

Style seems to play an even bigger part in outboard selling in 1957 than ever before. Scott-Atwater makes six interchangeable hoods for most of its line so you can match your motor to your girl's get-up. The choice this year includes red, white, mahogany, blue-green and gray. Johnson, Evinrude and Scott-Atwater all make a top engine mechanically like a lower-priced model but blessed with what is euphemistically called "custom" trim. This costs \$40 and up. **END**

Picture News

IN THE WORLD OF SCIENCE



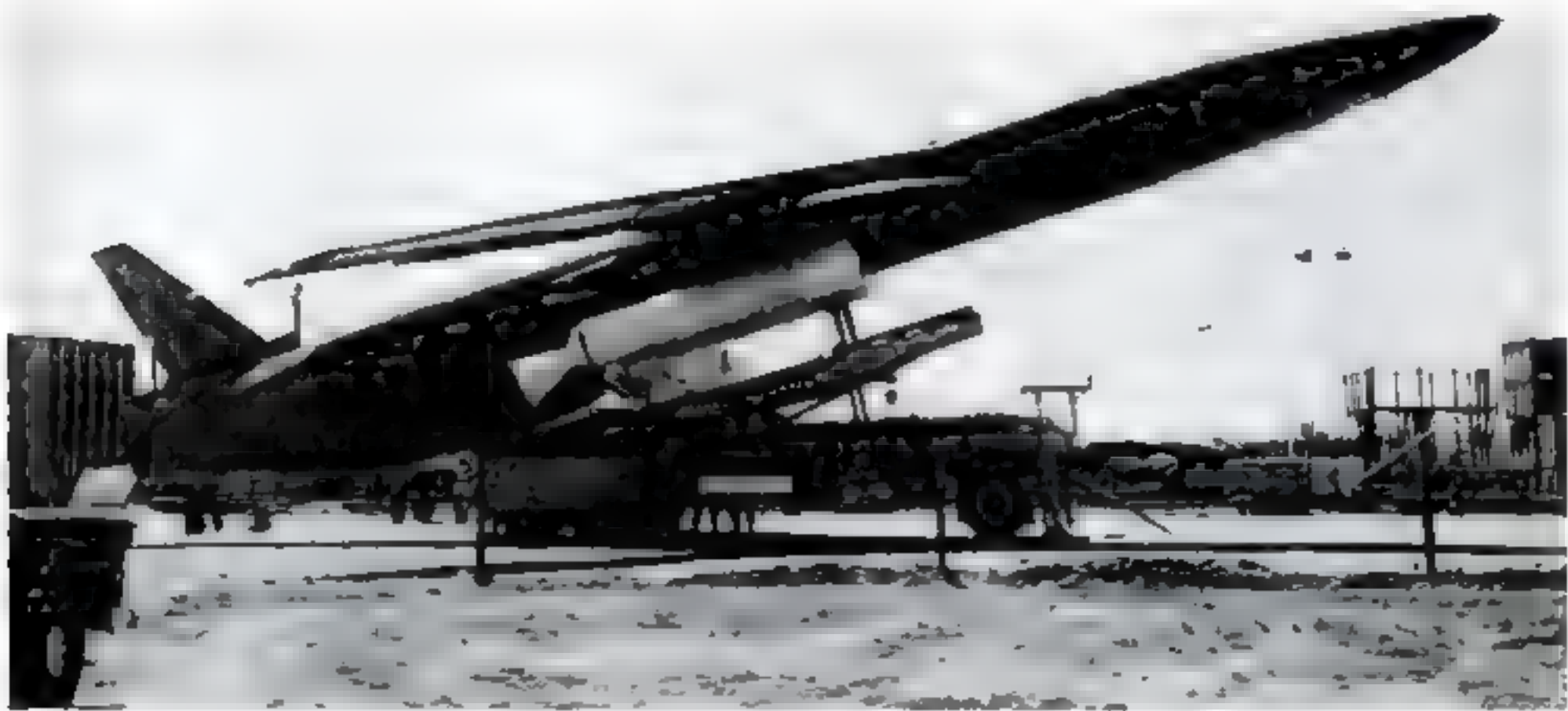
Here's a Sheet of Steel You Can Blow Smoke Through

Porous steel that "breathes" to let cooling air through, like the smoke going through the sample above, is now under test. Its purpose: to overcome friction heat in supersonic flight. Cuno Engineering Corp., Meriden, Conn., which makes it for missile hydraulic systems, is experimenting with it for transpiration cooling of plane skins and control surfaces.



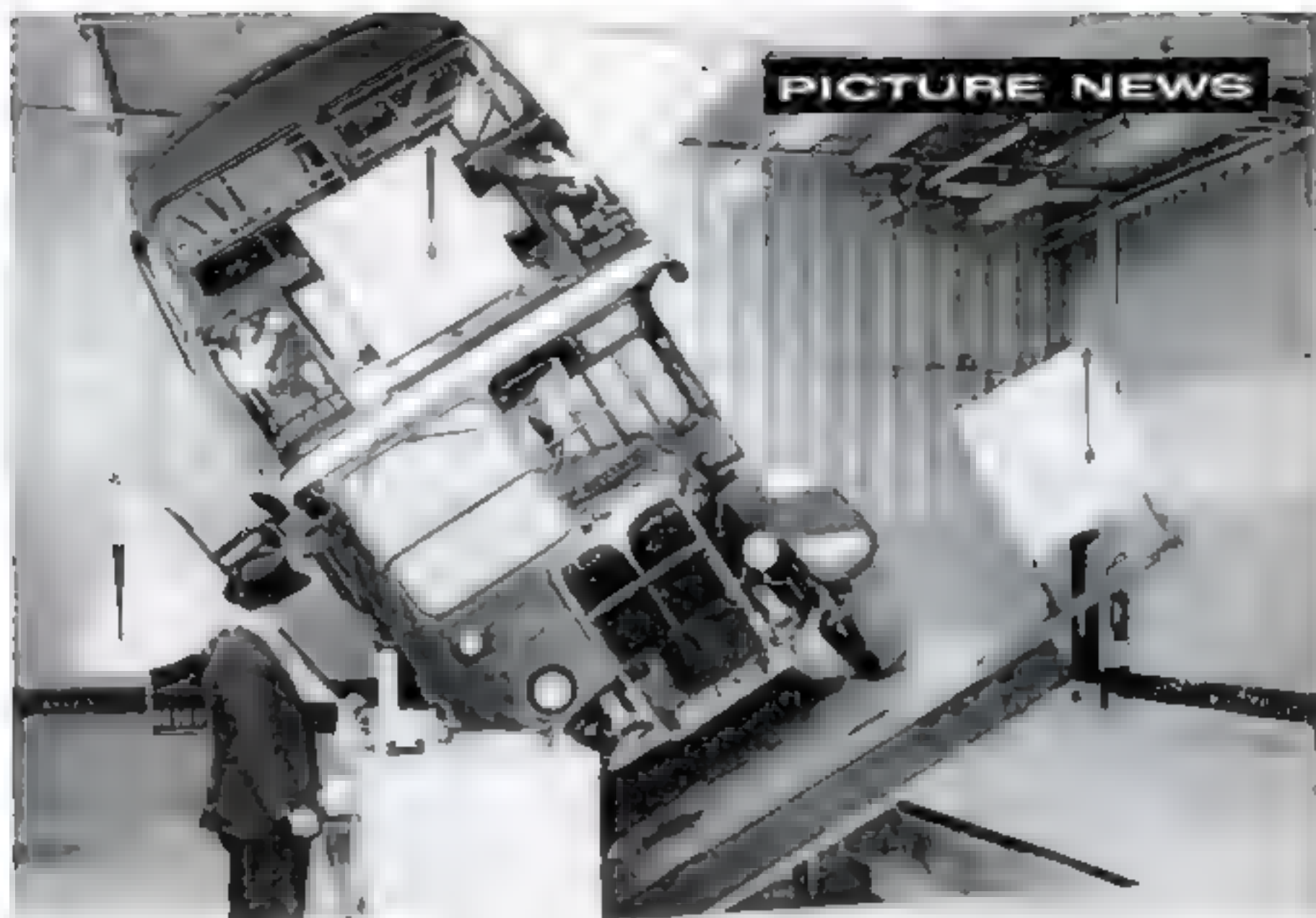
Masked Dog Helps Scientists in Altitude Studies

THIS strange beast is a St. Bernard who is cheerfully aiding the researchers at the USAF Wright Air Development Center. Dressed in protective suits and oxygen masks, the dogs—with monkeys and rats—supply data about physiology at high altitudes and extreme cold.



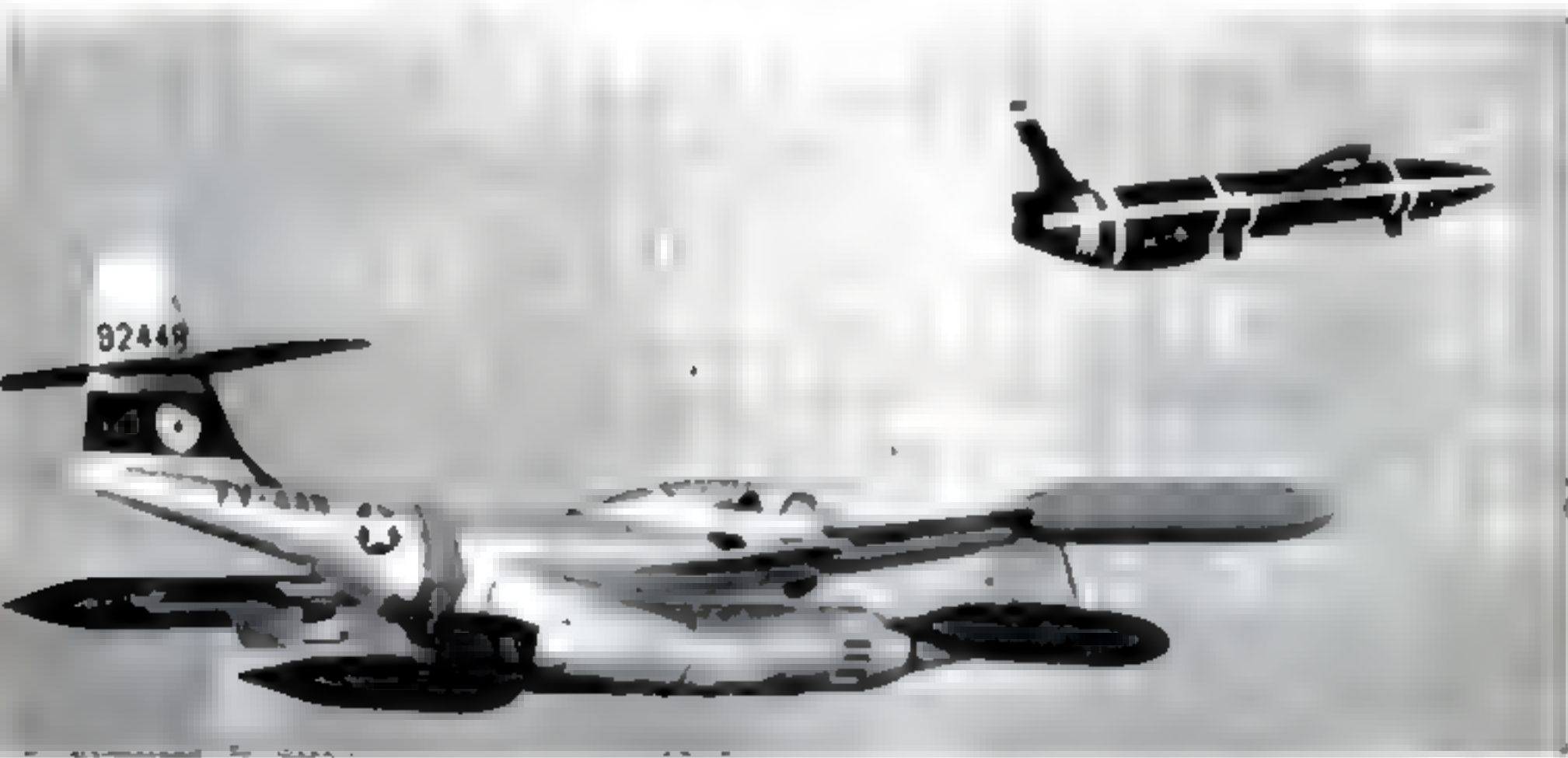
Mobile Launcher Sends Snark Up; "Stilts" Land It Intact

THE deadly Snark, first of the intercontinental atomic missiles to join the Strategic Air Command, is ready to take off here from a mobile launcher. At right, radio-guided by a Scorpion F-89 escort on a test flight without warhead, the 69-foot sweptwing Northrop pilotless bomber



Tipsy Double-Decker Hangs on Edge in Tilt Test

TO BE sure they won't keel over on a steep-slope road with soft shoulders, London's buses are test-tilted 28 degrees on a hydraulic platform after every overhaul. With the bottom empty, the upper deck holds ballast equal to 30 riders. The safety arms at left are there just in case.



lowers its "landing legs" as it homes for a landing that will leave its instruments unharmed for another test. The 5,000-mile-range Snark can cruise above weather at 600 m.p.h. to enemy territory and dive on its target at supersonic speed. It may be flown with its launching equipment anywhere in the world and launched there from a small hidden site.



Navy Fighter Refuels at 400 M.P.H. Like Big Brothers

IN THIS first test of a high-speed, high-altitude refueling system to extend the range of the Navy's jet fighters, the trailing F3H-2N Demon above took on 200 gallons of fuel a minute, flying 400 m.p.h. at 40,000 feet. The "buddy" fed it by probe and drogue from a new external tank.

Plush Outboard Saucer Will Find Fish Electronically

THIS circular craft, the "Fisherman," is powered by two Evinrude 18-hp. outboards and continues the futuristic styling of last year's sports-car-like "Lark," also designed by Brooks Stevens. The boat has been displayed with a simulated electronic control system showing how it

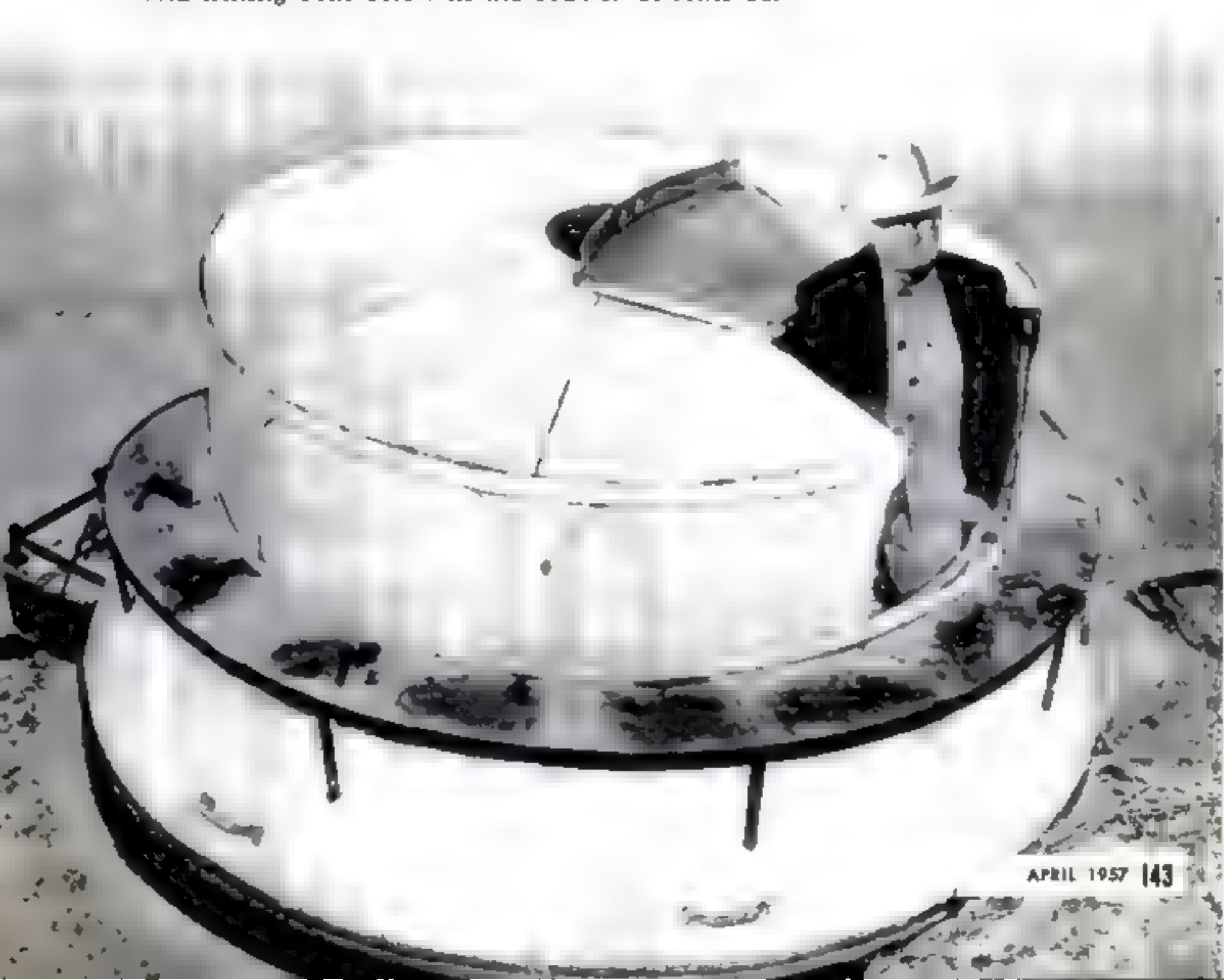




Float-In Movie Makes Debut on Swiss River

BOATERS and swimmers as well as motorists can see the show at this new kind of outdoor theater. The big screen, at left, is set up on the River Limmat in Zurich. During movie hours, police block off the river and roads, and spectators watch from barges, boats, bridge and bank.

could be equipped with TV, radar and the latest electronic fishing gadgets. As is, it seats eight plushly and costs \$14,000. It's steered, from a cockpit with airplane-type seats, by pivoting the motors and changing speeds. But it isn't a first: Bert Ross of Ottawa, Kan., built the five-hp. round fishing boat below in the 1920's. It seats 11.



PICTURE NEWS



Whirlybirds Do Square Dance

New H-19's now form the Army's Helicopter Square-Dance Team based at Fort Rucker, Ala. To the fiddles' twang and a caller's bid, they swing their partners, dozie-do and promenade at air-show hoe-downs throughout the country to demonstrate their maneuverability.

At left is a close-up of the painted face of one of the two rustic "swains" in the team. The other two are "girls."



Hawaiian Dome, All Diamonds, Has No Central Pillars

RESEMBLING a huge pineapple, an aluminum dome tops this 1,800-seat auditorium at Henry J. Kaiser's Hawaiian Village Hotel in Honolulu. Utilizing principles of aircraft-wing design, concave diamond-shaped panels were bolted together and braced with struts, thus eliminating the need for interior support. It was put up by 38 men in 20 hours.



All-Pine House Fulfills Lumberman's Dream

COLUMNS enclose closets (as at top), hold recessed shelves and act as room dividers (left in lower photo) in this house built entirely of southern pine. A flat shiplap ceiling appears peaked, and fireplace panels dip to a V. Owner Price Paschal, a lumberman of Brandon, Miss., had it designed by John M. Ware, a Jackson architect.



Test Car Spits Flame from Four Jet Engines

BRIGHT red and jet powered, this hot rodder's dream tests carrier arresting gear for Navy planes. It roars down a test track at 200 m.p.h. plus, pushing plane-weight loads. It stops, the load hurtles on into the gear. All American Engineering Co., Wilmington, built and uses it.

He Builds Better Speed Trap, But Catches No Motorists

GRIM at his living-room window, Larry W. Anderson, of Seattle, clocks a passing car on the speed timer he built from rubber hose and parts of an old pinball machine. City engineers find the timer accurate, but Anderson has to depend on cops to catch the many violators he spots.





"Meteor" Rocket Shows Way to Ultimate Weapon

FOUR stories tall, Lockheed's newly shown X-17 Re-Entry Test Vehicle blasts off from Florida base. At top of six-ton rocket's trajectory, last of three stages turns over, fires, hurtles earthward like meteor. Tests are helping Air Force to design Intercontinental Ballistic Missile that won't burn up when it plunges down at terrific speed from space into air.

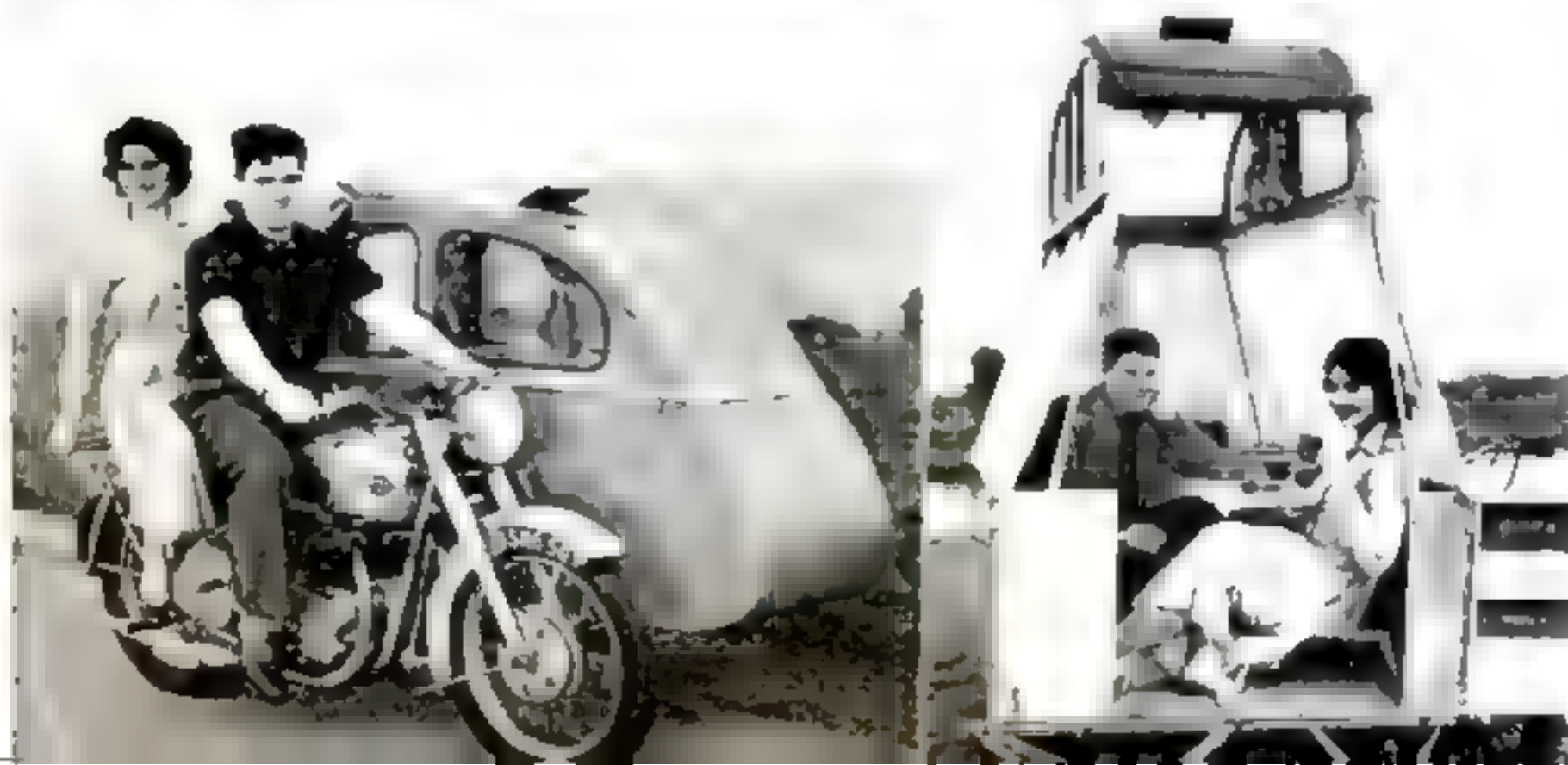


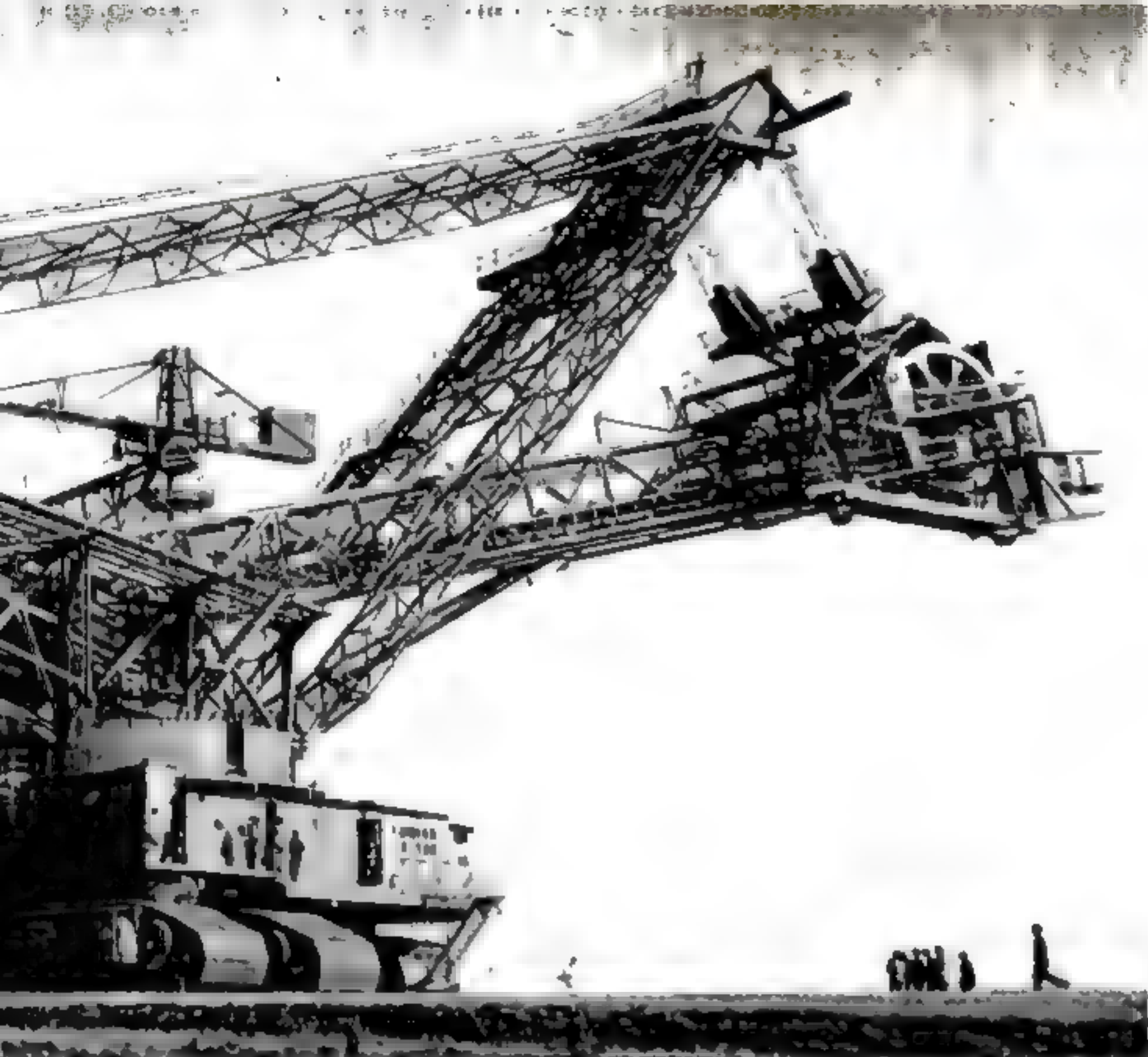
Mammoth Digger Claws 34,000 Tons Out of Earth Daily

CRAWLING on six 36-foot-long tracks, this gigantic 1,900-ton bucket-wheel excavator digs 3,100 cubic yards of coal an hour from East German open-cut mines and belt-conveys it to railway cars as much as 260 feet

Fold-Out Motorcycle Sidecar Opens Up into Tent

RAISE the roof and spread the hinged floor panel, and this British sidecar becomes a shelter on camping trips. There is room in it for a folding table and chairs, or for sleeping on a couple of air mattresses.

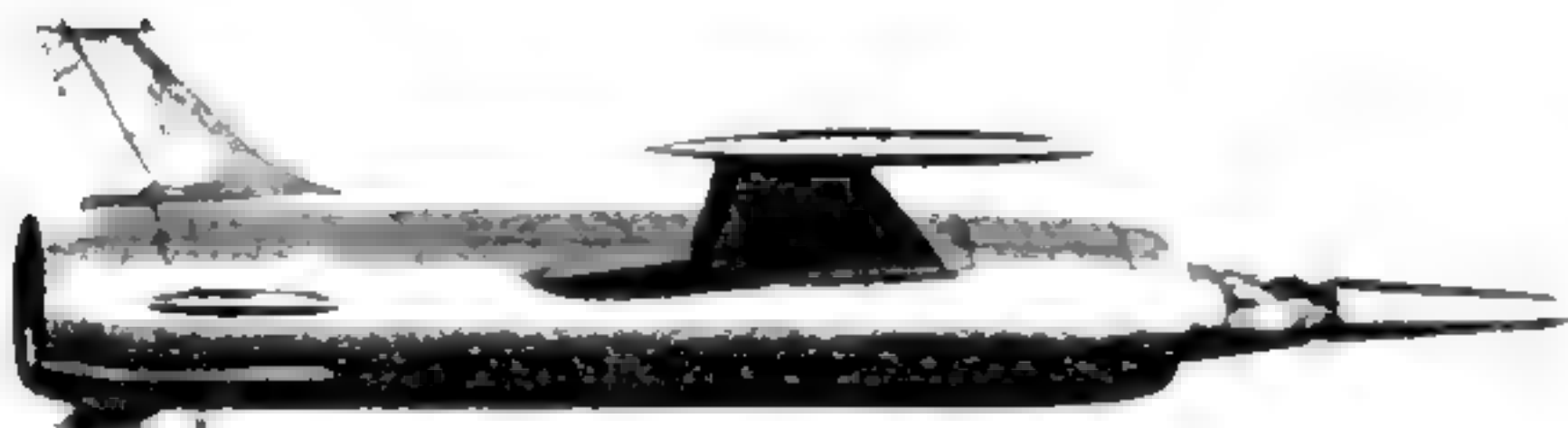


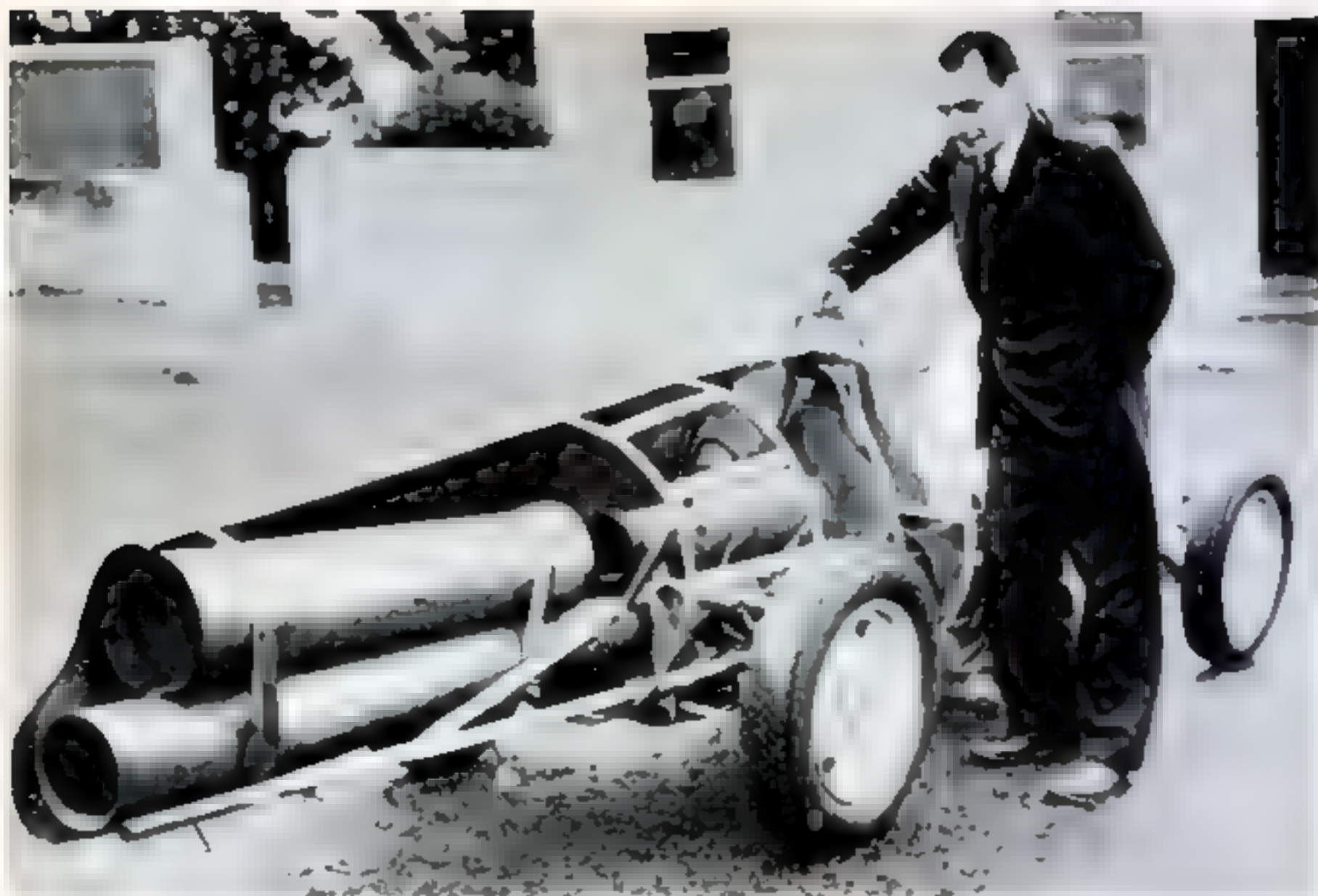


away. The 10½-foot wheel at right, handling eight big buckets, shovels 34,000 tons in an eight-hour day—enough to fill 1,700 20-ton cars. And the big machine carries with it many of the comforts of home for its crew, including rest rooms, in its house-like cabins.

“Flying Stovepipe” Makes First Ramjet No-Tow Takeoff

FRANCE'S Leduc 022, said to be twice as fast as sound, takes off with a turbojet assist. Earlier models had to be released aloft because ramjet engines won't function until they reach high speed.



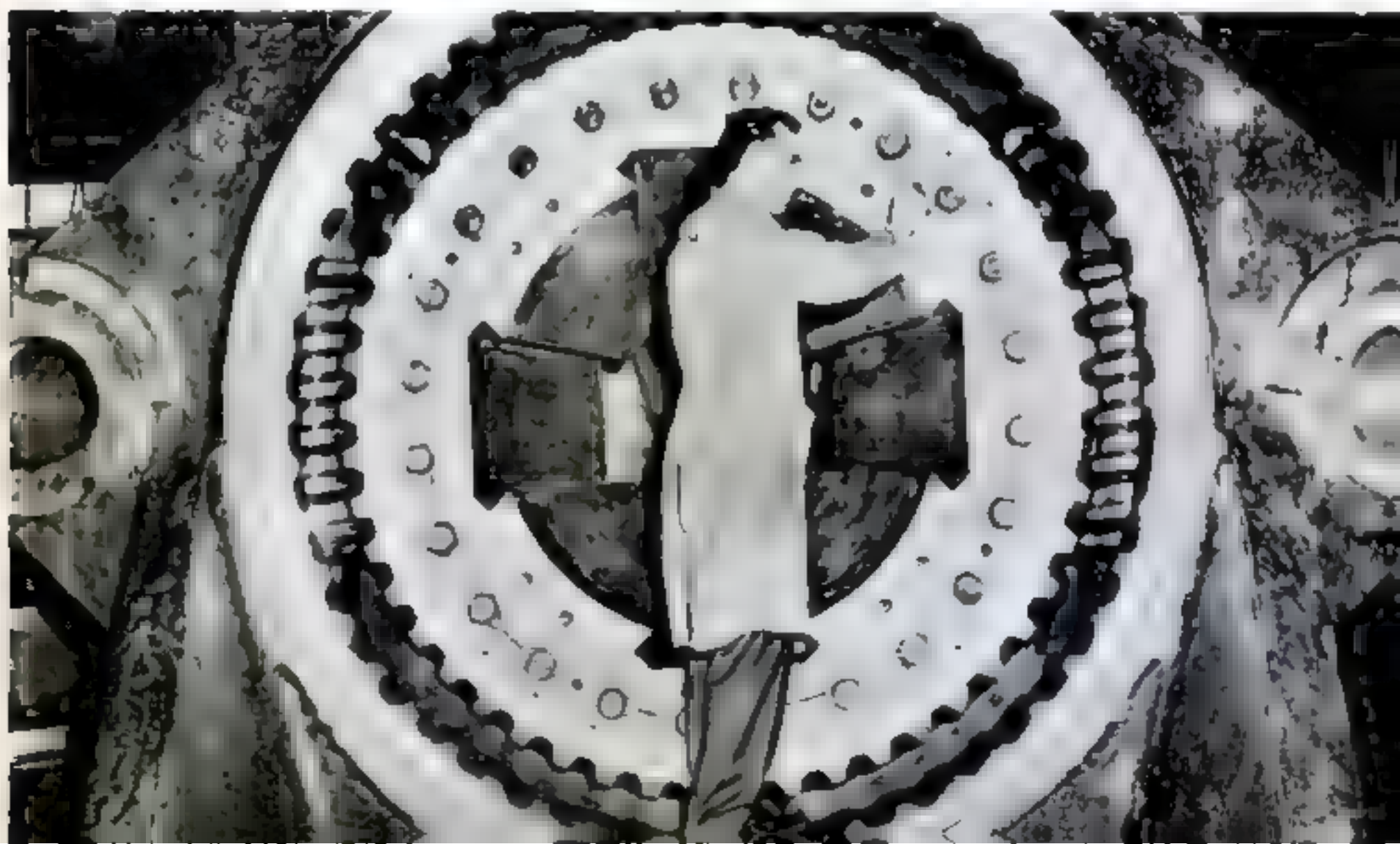


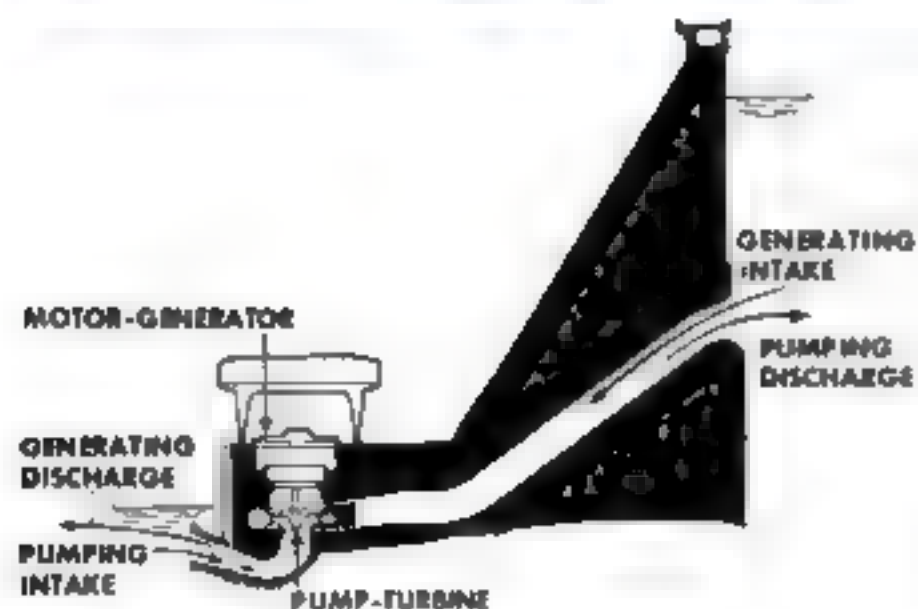
Jet Car Is All Set to Go, but Wheels Can't Roll

STALLED by fuel rationing, this jet-powered racing car has never had a workout. Its builder, J. L. M. Meikle of Bangor, Ireland, estimates that when he saves up enough fuel to slake its two-gallon-a-minute thirst, its top speed will equal that of the fastest small racing cars.

Powerful Gearset Will Help Build Big Planes

THIS huge gearset will put teeth into the Air Force's heavy press program. To match the force of its whopping 20,000,000 pound inches of running torque and turn the gear would require a 200-pound man straining at one end of a crowbar $2\frac{1}{3}$ miles long.

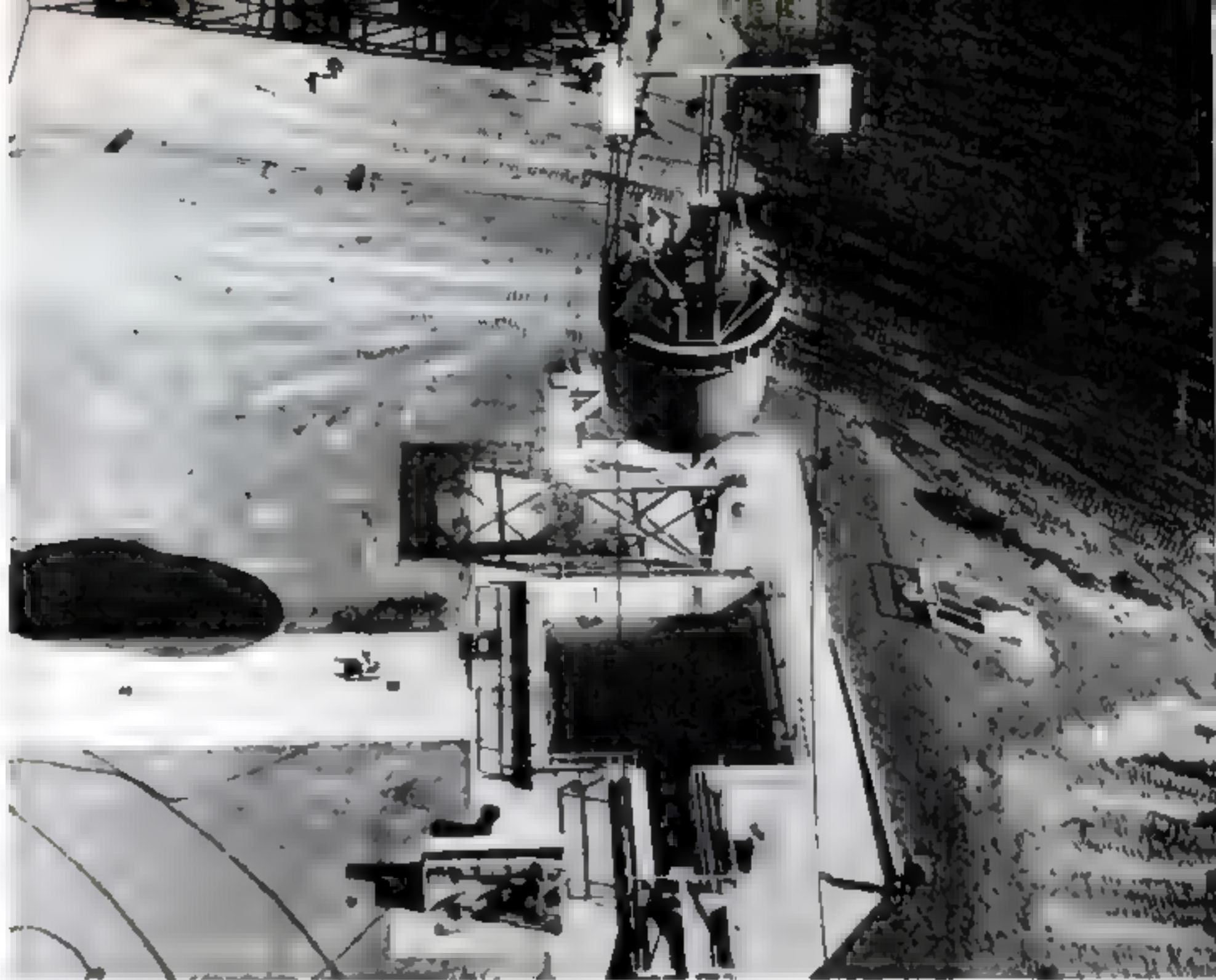




Water Goes Two Ways Over Dam

Not only does the pump-turbine in the left foreground generate power at TVA's Hiwassee Dam, it refills the reservoir. At peak demand hours, it's run as a turbine; water flowing through the wheel rotates the unit clockwise to turn a generator.

In off-peak hours, rotation is reversed with surplus power from other TVA lines, and the water wheel acts as a 102,000-hp. pump lifting 1¾ million gallons of water a minute to the reservoir.



Atomic-Plane Reactor Swings High in Spectacular Test

HUNG from towers that are out of range of its radiation, a shielded nuclear plant gets an "airborne" test at Oak Ridge, Tenn. The white objects above it are ray detectors. Between tests the reactor sleeps in the pool below. A B-36 carried a reactor in a similar test (PS, Oct. '56).

Thermos Bottle on Wheels Hauls Super-Cold Liquid Gas

THE first of a series of projects in the study of extremely low temperatures related to missile and aircraft propulsion, this tank transports 1,500 gallons of liquid gas at 460 degrees below zero. Beech Aircraft puts a powder in the vacuum between its walls to reduce heat radiation.





Field Artillery Guides Newest Missile to Direct Hit

THE Lacrosse guided missile, shown for the first time, proves its accuracy in field tests (below), scoring a direct hit between target markers. Designed to augment field artillery, the Lacrosse is launched from a standard Army truck. The Glenn L. Martin Co., which helped the Cornell Aeronautical Laboratory in its development, has it in production.



PICTURE NEWS



Underwater Bubble Pipe Keeps Ship Channel Ice-Free

THIS launching slip at a Swedish shipyard is kept open all winter by compressed air pumped through a perforated tube on the bottom. Bubbles bring up warm water to combat surface ice. Atlas Copco Eastern, Paterson, N.J., has installed units also on three Swedish ferry routes

New Ideas from the Inventors

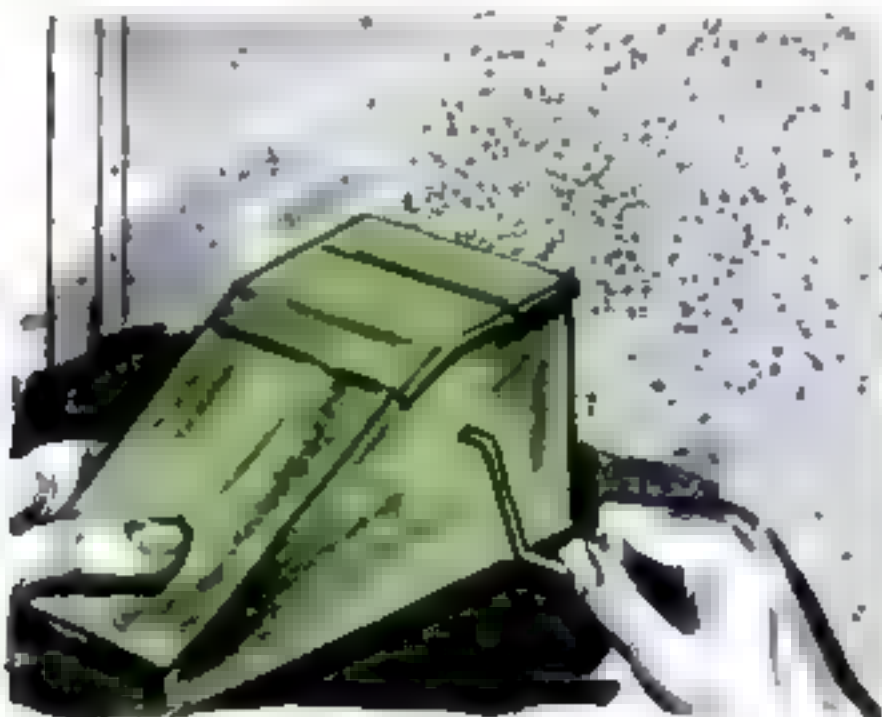


1 Balloons to Raise Sunken Ship. Forcing air-filled sacks into a hull, says this inventor, could displace enough water to float a sunken vessel. After a

diver had attached a connecting hose, a compressor and feed mechanism aboard a salvage ship would inflate balloons and discharge them into the submerged hull.

2 Crank to Spatter Paint. To give a wall a color-speckled finish, you'd pour paint (of one or more colors) into the chambers of this spattering gun, aim it, and turn a crank. Rotating, cup-ended strips of spring metal would pick up drops of paint and fling them at the wall

3 Buzzer to Remind You of Lights. You couldn't run down your battery by forgetting to turn off lights if your car had this memory aid wired into its electrical system. Opening a door while the lights were on would automatically cause a buzzer to sound a warning alarm.

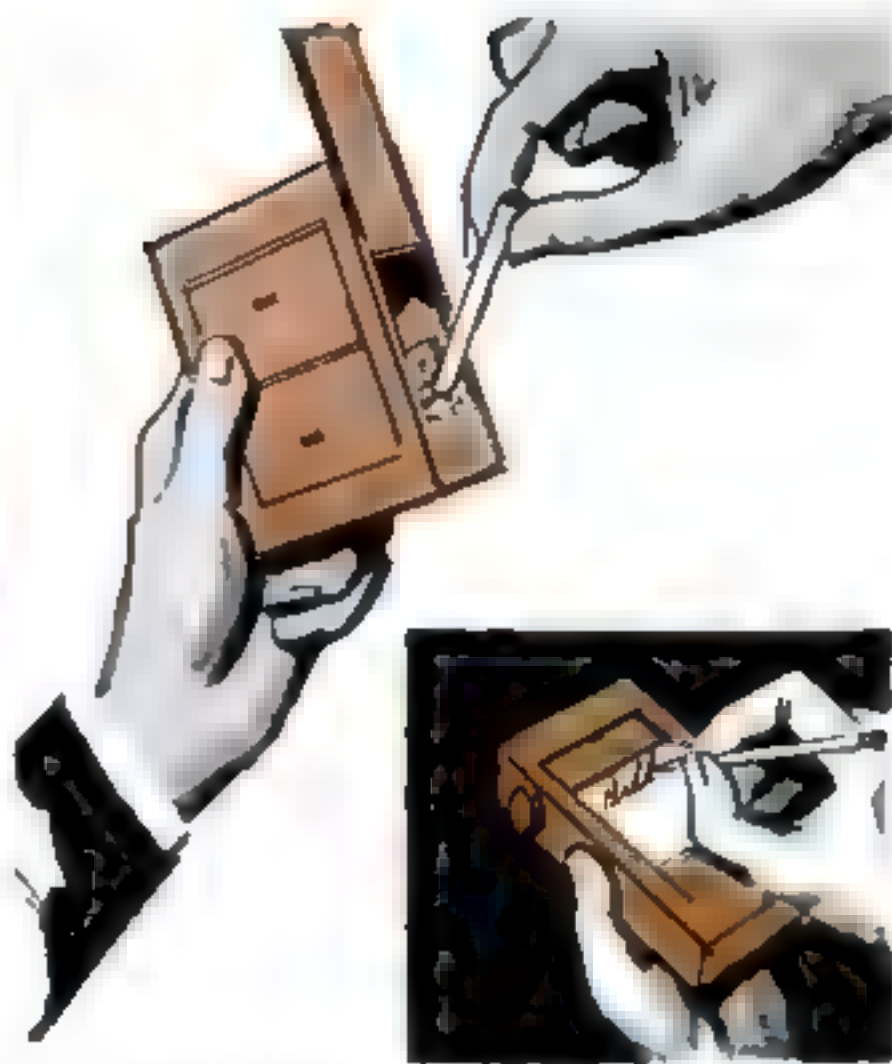


More Inventors' Ideas



4 Rod to Warm Your Hands. To take some of the chill out of cold-weather angling, this inventor would enclose a wick-type glow heater in the handle of a rod. Once lit, the heater's slow-burning fluid would both warm your hands and keep the oiled reel from stiffening up.

6 Outboard Mount to Vary Draft. With your motor mounted on this frame, the propellor could leapfrog over obstructions or work in shallow water. The



5 Cigarette Case to Carry Note Paper. A smoker wouldn't have to scribble memos on the backs of matchbooks if his cigarette case had this built-in paper roll. The crushproof holder would take a full pack in the space between the two windup reels of the paper tape.

prop would be held well back of the boat so you could lift the motor without tipping it or shutting it off. A long-armed lever would adjust it vertically.





7 Foil to Hold Plant Moisture. To help plants grow in arid places, Reynolds Metals Co. suggests a machine that would anchor sheets of perforated aluminum foil over seeds it's planting. The foil would slow soil-drying action of the sun, thus keeping more water for roots.

8 Guard to Cover Tack Point. You couldn't scratch yourself on a thumb-tack like this, because when it wasn't seated its point would be covered by a soft rubber or plastic bulb. Driving the tack, however, would cause the guard to slide back on the shank and form a cushioned, paper-protecting head.



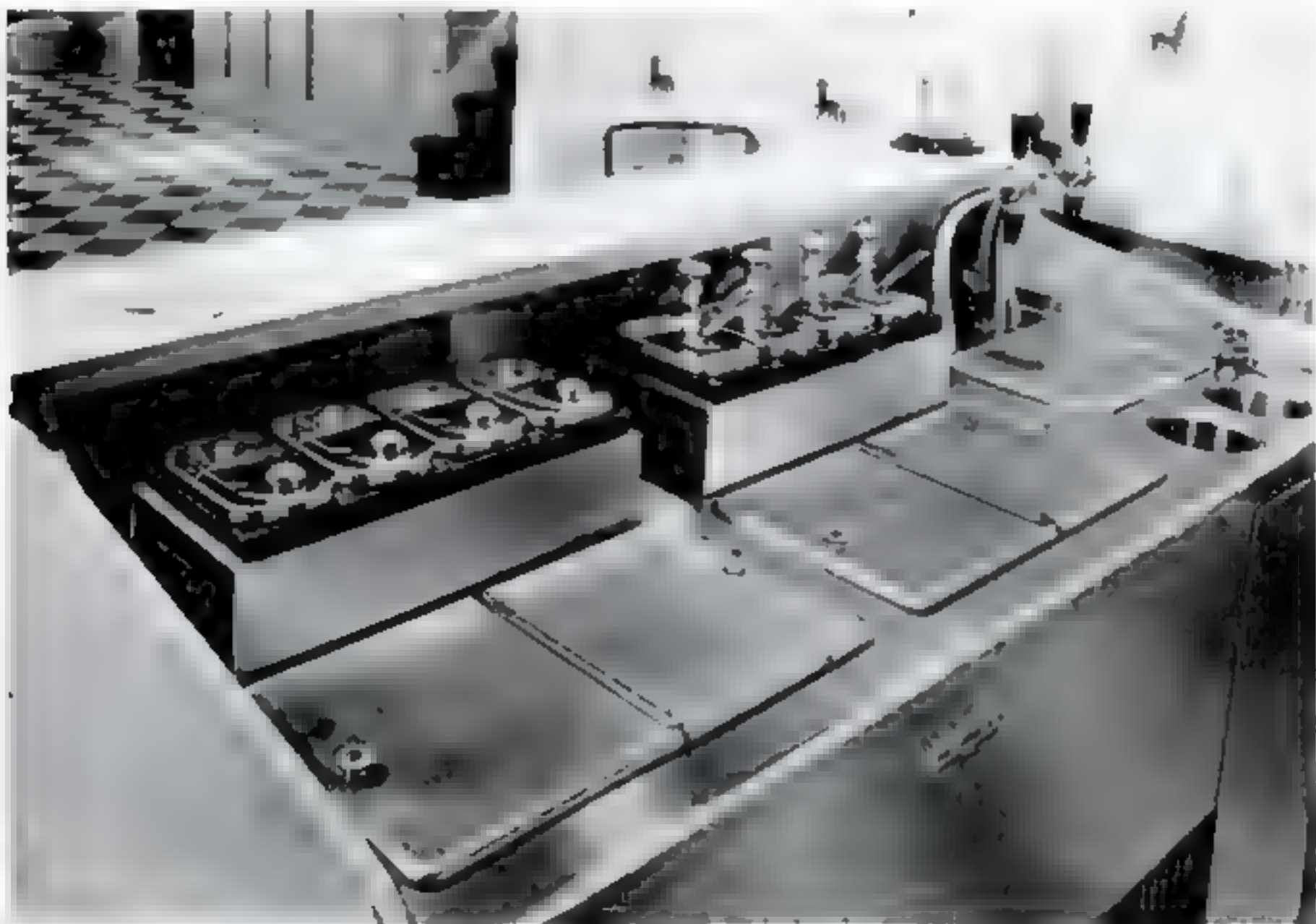
9 Hinge to Take Up Sag. You could fix a sagging door quickly and without taking it down if it were hung with a pair of these adjustable hinges. A bolt-and-slot arrangement on each hinge would let you shift the door till it was properly aligned, then lock it securely in position.

The following patents have been issued on these inventions, 1. Patent No. 2,768,601 to Harry W. Davis, Berkeley, Calif.; 2. No. 2,763,510 to Joseph Di Nicola Brooklyn, 3. No. 2,742,630 to Frank M. Mancheryan, Duarte, Calif.; 4. No. 2,758,302 to Clarence R. Phipps, Portland, Ore.; 5. No. 2,716,484 to Goldwin A. Wepples, Vanguard, Saskatchewan, 6. No. 2,713,843 to Thomas G. Staley, Eagle Point, Ore.; 7. No. 2,740,233 to Julian L. Reynolds, Richmond, Va.; 8. No. 2,712,201 to Lincoln D. Anderson, Hanford, Calif.; 9. No. 2,700,760 to Claude F. Cornwell, Louisville, Miss.

Copies of patents may be ordered, by number, from the Commissioner of Patents Washington 25, D.C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.

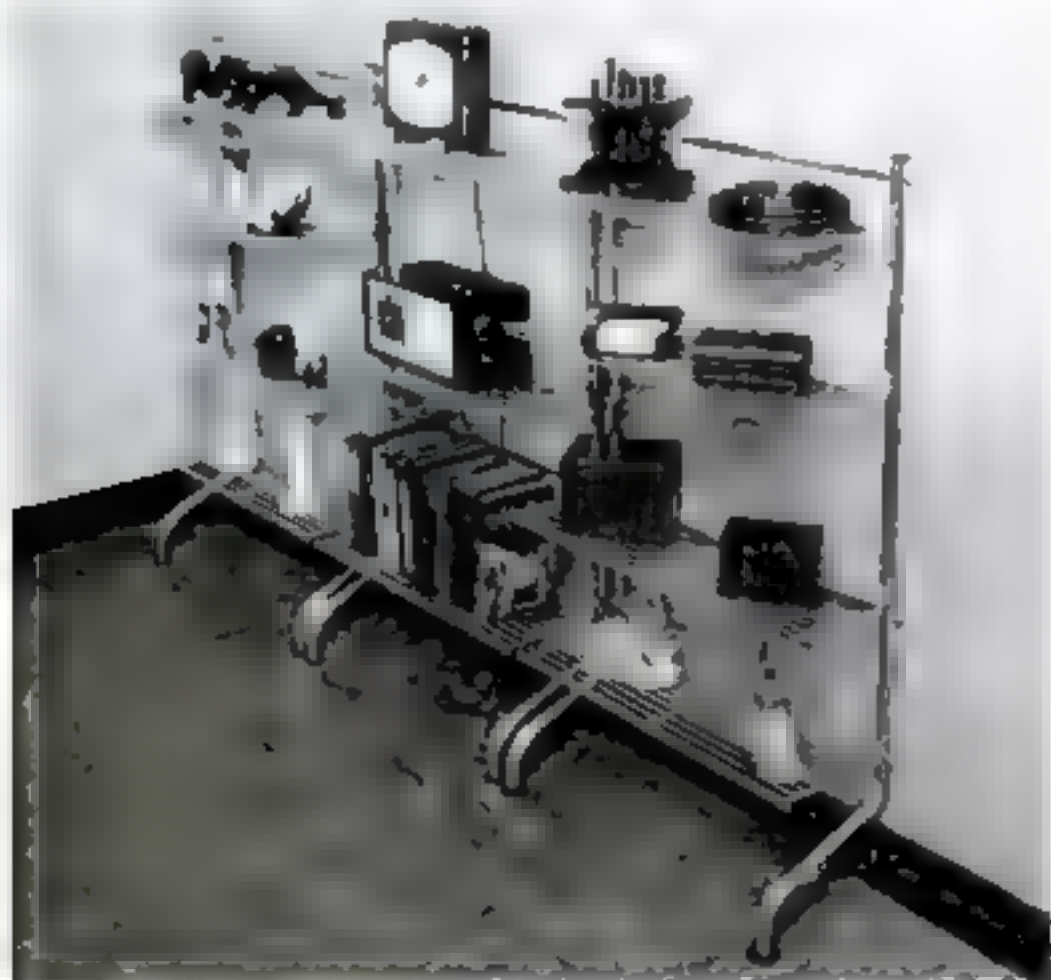
New Aids to Living

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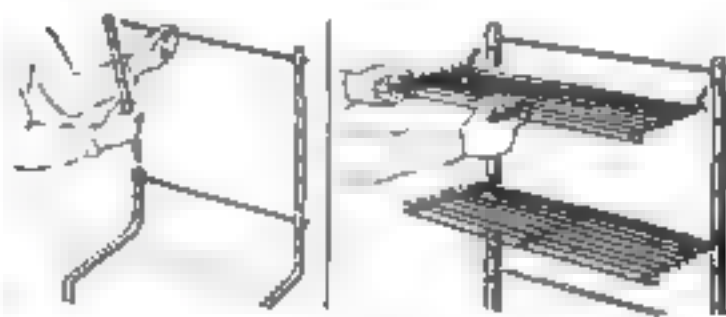


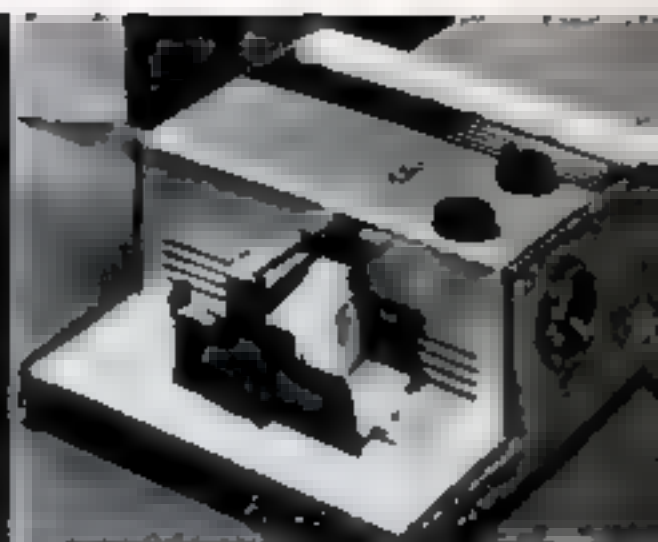
1 Family soda fountain makes any recreation room an oasis for the juke-box crowd. Strung along its 5½-foot length are syrup wells, crushed-fruit jars, soda- and water-draught arms, a sink and a refuse can. Hidden under stainless steel

are a compressor, soda and water cooler, freezer and refrigerator bins. A soda jerk behind it can mix cokes, ginger ale and fruit-flavored drinks for less than two cents a glass, ice cream sodas and sundaes for about a dime each.



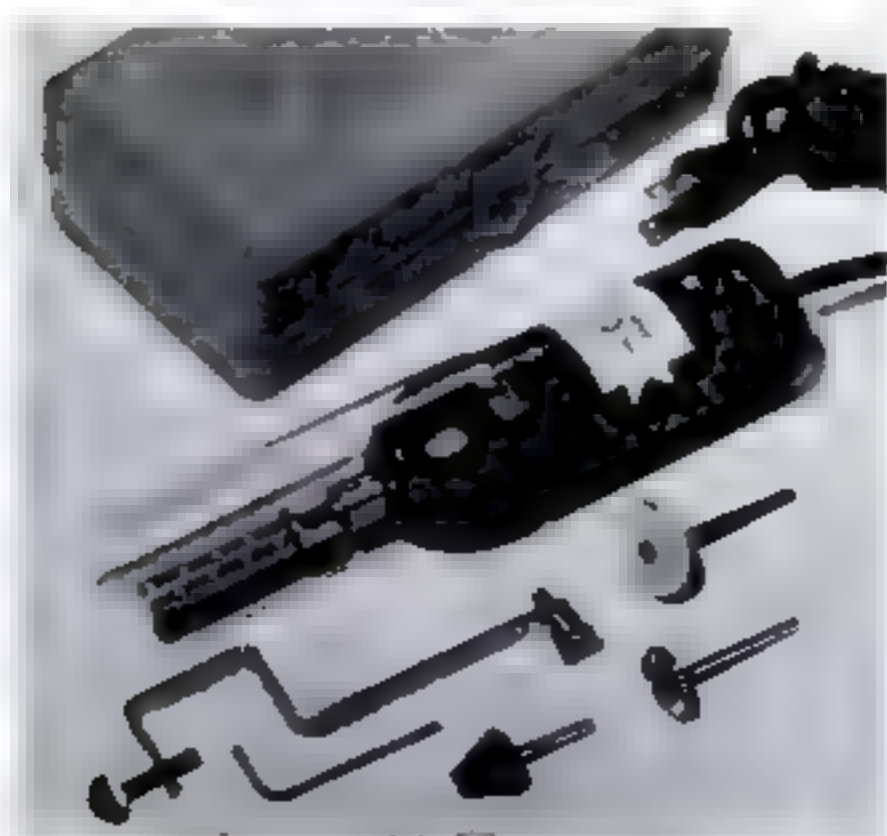
2 Add-on shelf units balance their weight against a wall, or two units bolted back-to-back form a room divider. Steel tubes lock into curved legs and wire shelves hook into spaced holes. By adding on more tubes, the sections can be stretched from floor to ceiling. You can choose black or brass-finished parts, or combine the two.





3 Repeater flashgun loads with a circular magazine (foreground) that rotates to bring new bulbs into position for six shots. The slide changer on the projector at upper right uses a rotary movement to pop slides into place and avoid

catching one on another. A second model has an automatic changer with a magazine that stores 36 slides. The built-in-flash camera costs only \$8.50. Eastman now makes Ektachrome in 127 size to fit this and other small cameras.



4 Electric fish scaler readies a catch for the pan without fuss or muss. It's also a power tool for sharpening knives, polishing reels, spoons or spinners.



5 Self-propelled wheelbarrow has a 2½- or 3-hp. gasoline engine driving a baby hand truck with a 25-inch-long flat bed. The tray has 1,000-lb. capacity.

More information about the products shown on these pages can be obtained from: 1. James J. Garigan Co., 104 Fifth Ave., NYC.; 2. DuBoff & Co., 319 Jefferson St., Newark 5, N.J.; 3. Eastman Kodak Co., 343 State St., Rochester 6, N.Y.; 4. Abercrombie & Fitch, 360 Madison Ave., NYC.; 5. Green White & Ponce, Inc., Skinner Bldg., Seattle, Wash.



*Under the raised hood
of the old car,
Gus saw a powerful,
souped-up engine.*

That dark night, the Model Garageman worked as he had

Gus Beats the Gun

By Martin Bunn

A CHILLY wind-driven rain swirled in the headlight beams of Gus Wilson's truck as he was returning from a late service call in the country. Suddenly the husky proprietor of the Model Garage jerked erect in his seat and jammed on the brakes as a figure dashed onto the highway, signaling with a flashlight. Gus cut the wheel sharply and pulled up on the shoulder.

As he rolled down the window, the flashlight, which had been moving over the lettering on the truck, came to rest on his face. The blinding beam of light moved closer—until it blazed into Gus's eyes from an arm's length away.

"Move over," a quiet voice ordered.



never worked before . . . to put two killers back on the road.

The beam lowered slightly and in its light Gus saw a hand holding an automatic. It was pointed at his chest. For a moment, panic seized him.

"Sure," Gus said, easing from behind the wheel carefully. The man got into the driver's seat and the flash beam winked off.

"The gun is in my lap," he said softly as he shifted into gear. "I can reach it quick. So don't try any tricks."

They drove down the highway in silence. At last the man said, "We saw you pass by on your way out. We figured you'd be coming back pretty soon. We need a mechanic."

They were turning off the highway now,

into a forested area where folks came in summertime for picnics.

"Why the gun?" Gus asked. "Without it, I might not have suspected who you are."

"With the papers full of our pictures? And descriptions going out on radio and TV?" The man snorted. "That's a laugh."

Gus turned a thoughtful eye on him. "I guess you're right," he said. "Two toughies, wanted for murder. I'd say you were the tall one, six foot two, dark hair, dark suit, brown hat. You're Slade, aren't you?"

A soft chuckle answered him. "How right you are, friend."

Ahead of them, the headlights lit up a

small clearing. A blue coupe stood in the center, a man leaning against it. He came out now to the truck.

"Douse those lights, you fool!" he called sharply.

As the lights flicked out, a flashlight appeared in his hand. Its beam played over Gus's face. "Get down, grease monkey, and get to work," the man said harshly. "We didn't bring you out here to go on a picnic."

As Gus eased himself to the ground, the soft-voiced Slade said, "He knows who we are."

"That so?" the man said. He reached out a powerful hand and grasped the front of Gus's coveralls, twisting the cloth, squeezing Gus's chest. For a long moment he gazed thoughtfully into Gus's face.

The sound of wind and rain lashing the trees came to Gus now in the silence. He felt the awful remoteness of this lonely spot. What was to stop these men from killing him? He knew them—Warren Slade and Sidney Bascom, wanted by the police of three states for murder. The soft-spoken Slade, standing behind Gus now with a gun in his back, had shot down a bank teller during a holdup. His partner had seriously wounded a guard.

It was Gus who finally broke the silence. "Let go," he said. "Let's take a look at the car."

SLOWLY Bascom's grip relaxed on Gus's coveralls. "It's the lights," he said. "If they hadn't gone out, we'd have been through the net by now and far away. Your job is to fix the lights."

"Lights or no lights," Gus said grimly, "they'll pick you up. The police will have roadblocks set up."

"Roadblocks!" Behind Gus, Slade chuckled. "I can spot them a mile away at night. Out here in the sticks they don't have enough cops to block all the roads. If we run into any, we can turn around and go the other way. Our car will outrun any cop car. Fix those lights and we'll take care of everything. Get going."

Gus turned slowly, reached into the truck for his tool kit and walked toward the blue coupe. Slade moved carefully behind him while Bascom played his light on the car. It was an old model, a car not apt to attract police attention. Its appearance was deceptive, for under the raised hood of the old car Gus saw a powerful,

souped-up engine—four-barrel carburetors, special head, overdrive . . . the works. This job could probably outrun most police cars.

The thought bore heavily on Gus's mind as he reached inside the coupe to turn on the light switch. No lights came on. Gus played his pencil light over the dashboard, noting that the ammeter showed no discharge. Maybe, he thought, there was nothing wrong but a loose connection or a dirty circuit breaker, something he could fix in a moment. And then this pair would be on their way to rob and kill again.

SLADE'S light played over Gus's face. "Any tricks, mister," he said in his soft voice, "and you bleed."

"I'm no fool," Gus said heavily, squeezing in under the dash, peering up at the maze of wires and instruments. Presently he backed out, pawed through his kit, went in again and came out to turn on the light switch. Twin headlight beams sprang into the stormy woods. Bascom cursed as he leaped to turn the switch.

"The rope, Sid," Slade said. "Tie him up—tight." Bascom took a rope from the coupe, came forward in the dim glow of the parking lights, then halted.

Pointing, he growled, "Why no tail lights?" Ferocity came to his sharply hewn features as he moved on Gus with upraised fist. The brawny mechanic turned, shoulders hunched to meet the attack.

"Hold it!" Slade broke in. "How about it, grease monkey? Why no tail lights?"

"You had a blown fuse," Gus said quietly. "Probably a short in the tail-light wire—it will probably blow again."

"Find it and fix it then," Slade ordered. "Fast."

"Maybe I can find it fast and maybe not," Gus said warily. "The quickest way would be to forget the old wire and run a new hot lead to the tail lights."

Slade studied Gus's face for a long moment. "Okay," he said at last.

GUS got a roll of wire from his truck, worked under the dash a few moments, then crawled beneath the car. He emerged at the rear, dripping wet. He turned on the light switch again. This time the twin tail lights glowed.

"Good," Slade said with satisfaction.

"Now tie him up, Sid, and we'll roll."

"Tie a man up in this storm," Gus protested, "and he'll get pneumonia before he's found."

"Tie him," Slade repeated, agate eyes hard above the soft voice.

They tied him in the cab of the service truck and left him. Gus lay there, listening to the storm, wondering how long it would be before he was found. Stan Hicks, his helper in the Model Garage, would think that he had been delayed and might close shop and go home. Gus realized he might be here a long time. Somewhere out there on the highways, he knew, would be men like Officer Jerry Corcoran. They might spot the blue coupe, but what then? Gus tried to visualize what might happen.

ON A night like this, the police would not dare to park a car across the highway without flares to warn the innocent. The deadly pair would be warned, and would flee in the other direction. With escape routes carefully planned, a hideout waiting and their speed, they could make it.

An inner voice reproached Gus. If he had not repaired the coupe's lights, Slade and Bascom could not have stirred.

As time passed, the chill began to bite into his bones. He fought the rope that held him, but it had been too cleverly tied. It seemed to Gus that hours passed before he heard a car, saw its lights moving among the trees.

"Gus," Jerry Corcoran called. "Are you there?"

Gus yelled, "Here. Did you get them?"

"Are you hurt?" Corcoran asked as he worked on Gus's bonds. "No? Good! They told us that they'd tied you up in here. They saw our roadblock and tried to turn back. But something went wrong with their car. They couldn't get it into reverse."

"I know," Gus said. He began chafing his hands and stamping his feet to stimulate circulation. "They wanted me to fix their lights. But when I fixed them I cut the wire to their tail lights under the dash, so that I'd have an excuse to get under the car with wire in my hands to rewire the tail lights."

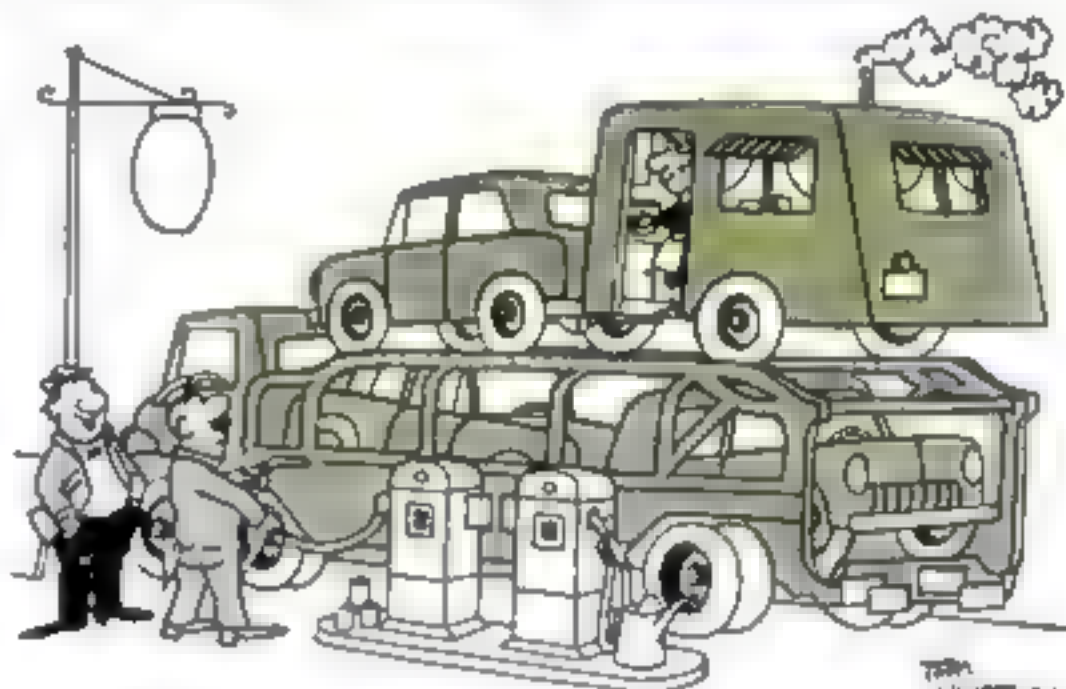
Corcoran was puzzled. "What's that

got to do with their not being able to back up?"

Gus chuckled. "I merely put the cut tail-light wire together again while the lights were turned off. Then, while I was crawling under the car, I strung a hot wire to their overdrive solenoid."

"Come again?" Corcoran queried.

"You see," Gus explained, "when an overdrive-equipped car reaches about 25 miles an hour speed, a governor activates a solenoid to put the drive into overdrive, and at the same time bring about a re-



"Then she said, 'But you promised to take me to Florida...'"

verse-gear lockout. I'd run into a few cases where, through a shorted governor, this solenoid was activated when the car was standing still, or traveling below overdrive speed. In these cases you couldn't get into reverse gear at any speed. My wiring eliminated the governor, put juice directly to the solenoid, but permitted the car to move forward in overdrive gears. I figured that sooner or later they'd have to get into reverse to dodge you fellows."

"WELL I'll be..." Jerry Corcoran began. Then, remembering Gus's ordeal, he said, "Jump in, Gus, I'm taking you in before you catch pneumonia."

"I'll drive my truck. I'm okay now," Gus said, getting in and starting the engine. "It's got a good heater, and—you know something, Jerry?—since you told me the news I'm not as cold as I was."

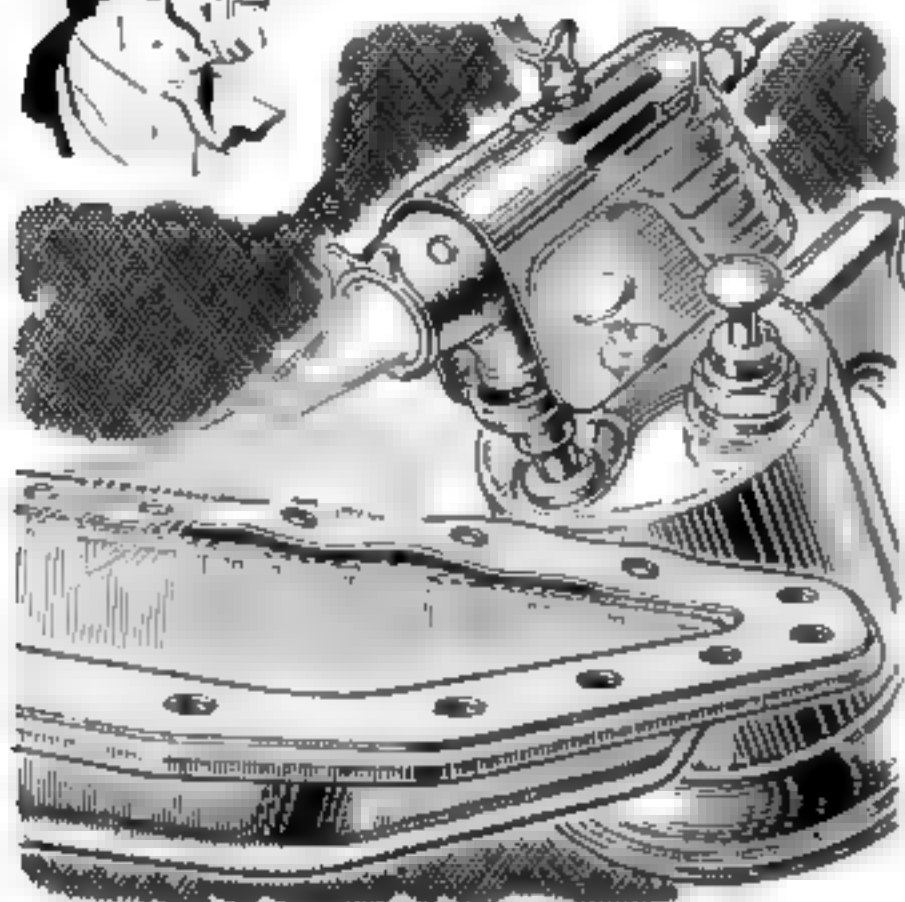
"That I can believe," Officer Corcoran said fervently.

The lights of both vehicles began creeping out of the trees toward the highway. Gus Wilson looked relieved—and a little pleased with himself.

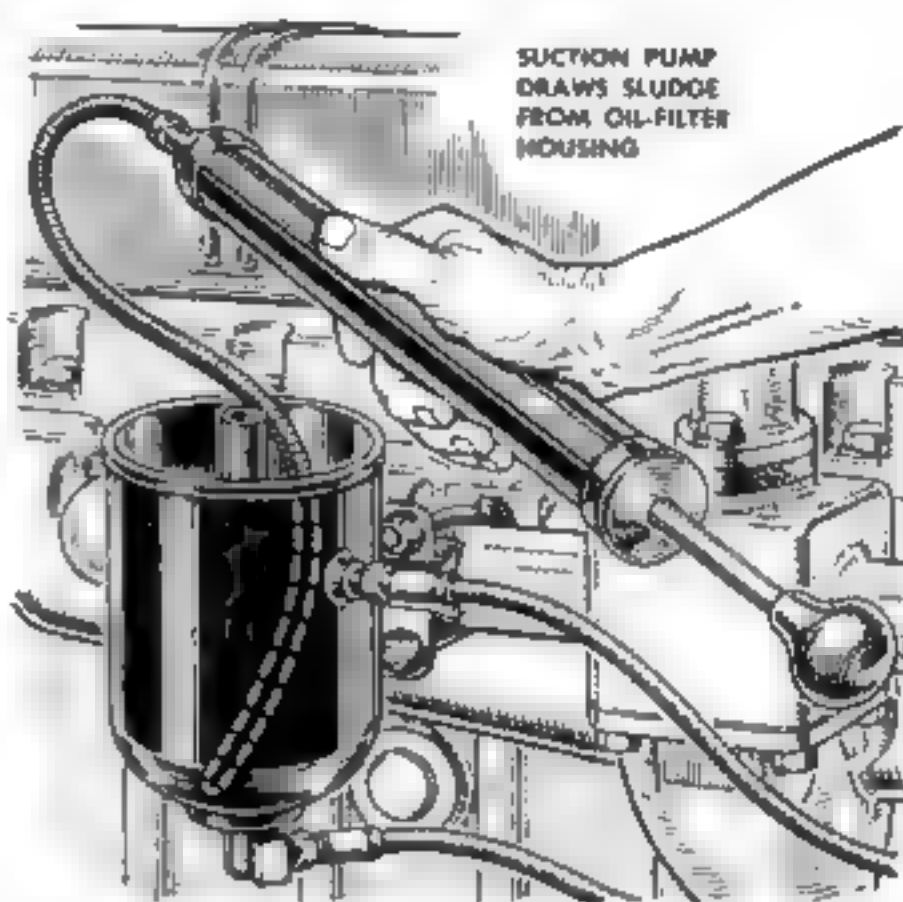
Next Month: Gus tackles an antique.



Hints from the Model Garage

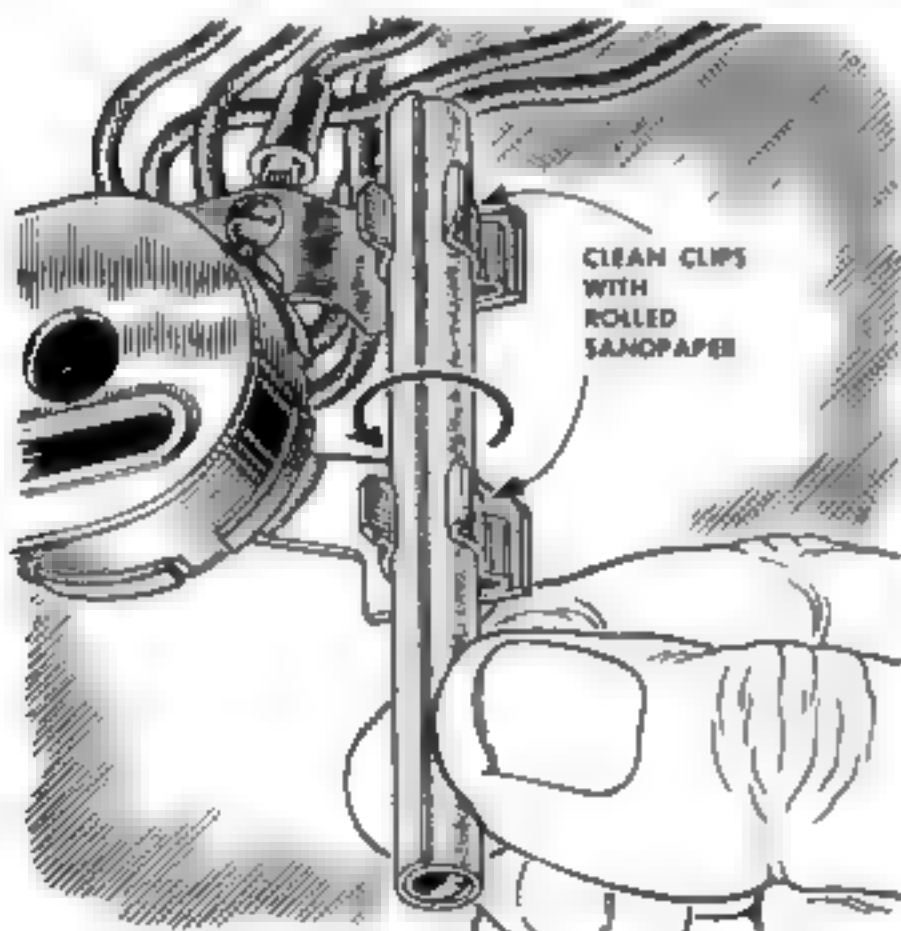


Remove a stuck-on oil-pan gasket without tedious scraping by passing a blowtorch over it. Don't burn the gasket, just heat it until it loosens and peels off easily. Wipe the pan clean before applying the torch, so that the oil doesn't ignite as you play flame around the edge.



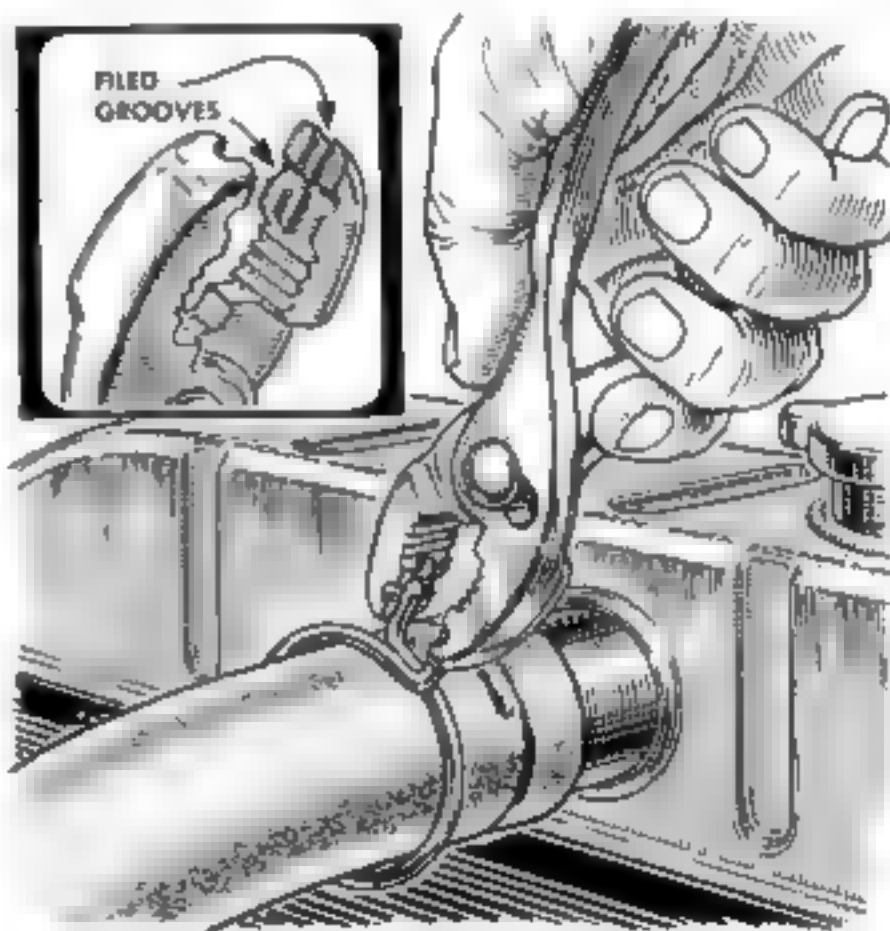
SUCTION PUMP
DRAWS SLUDGE
FROM OIL-FILTER
HOUSING

Changing an oil-filter cartridge? It's important to remove the sludge from the bottom of the filter housing. If there's no drain plug, this gook can be drawn out with an inexpensive suction gun used for draining and filling differentials. Then wipe the housing clean with a rag.



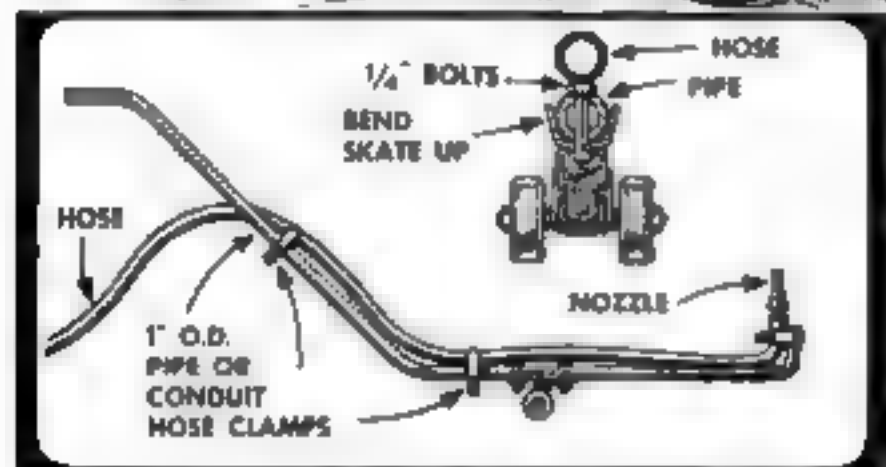
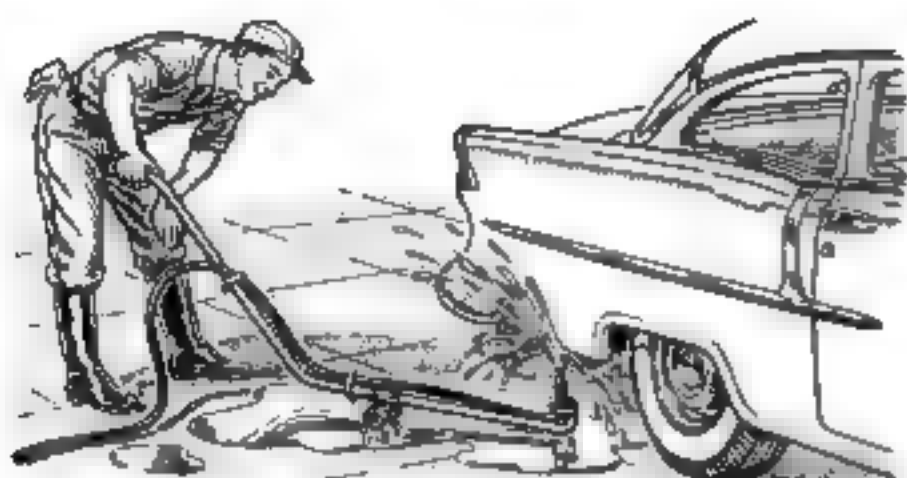
CLEAN CLIPS
WITH
ROLLED
SANDPAPER

Electrical accessories will give peak performance if the inside surfaces of fuse clips and the fuse ends are clean; corrosion adds resistance to low-voltage circuits. Sand them lightly and bend the clips together slightly for tighter contact.

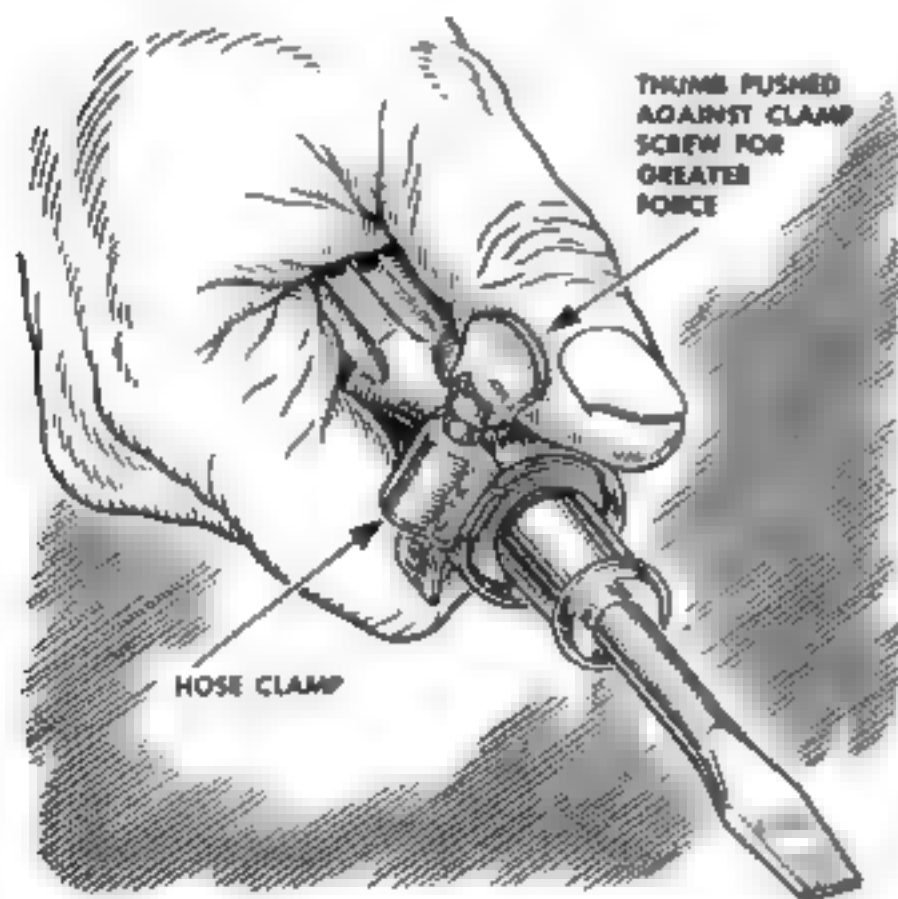


FILED
GROOVES

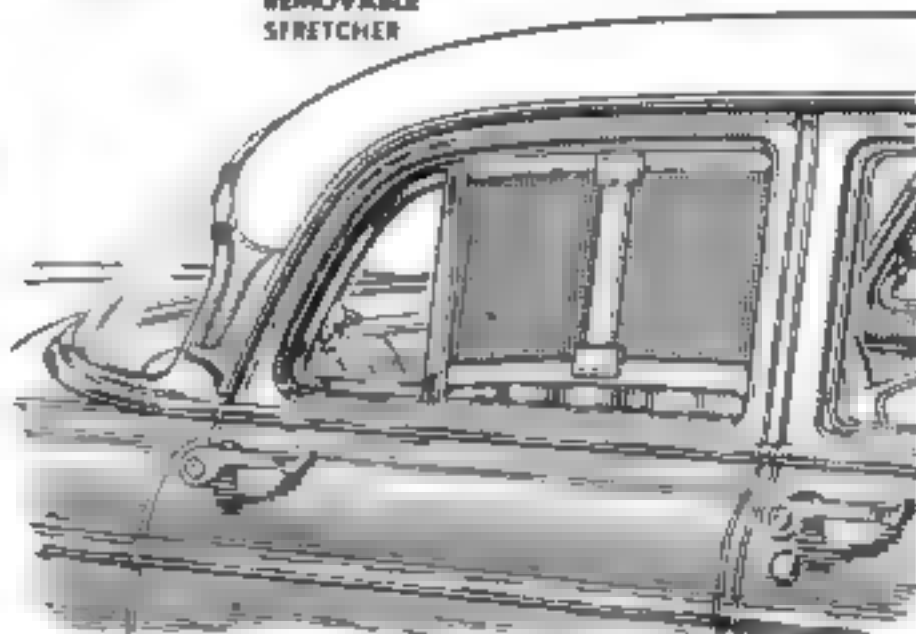
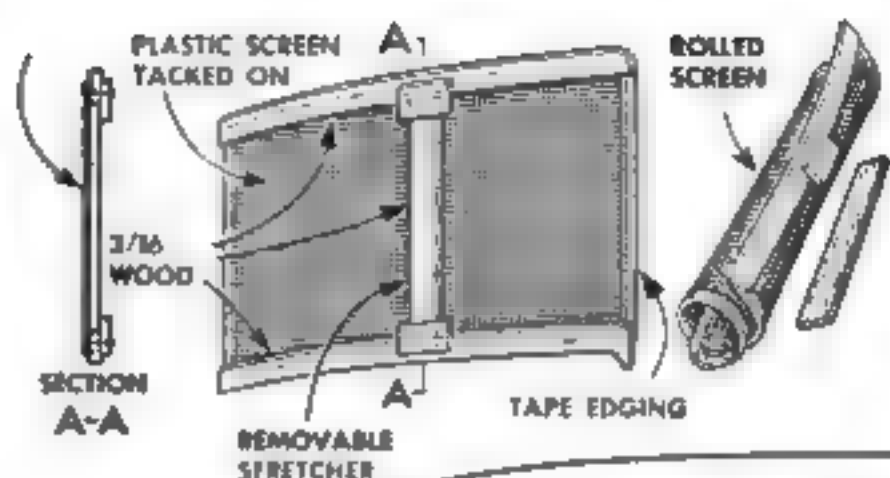
Spring-type hose clamps can be removed easily if grooves are filed in the jaws of a pair of pliers to keep the spring tabs from slipping. File a set of grooves parallel with the jaws and another set across the jaws for use in all positions.



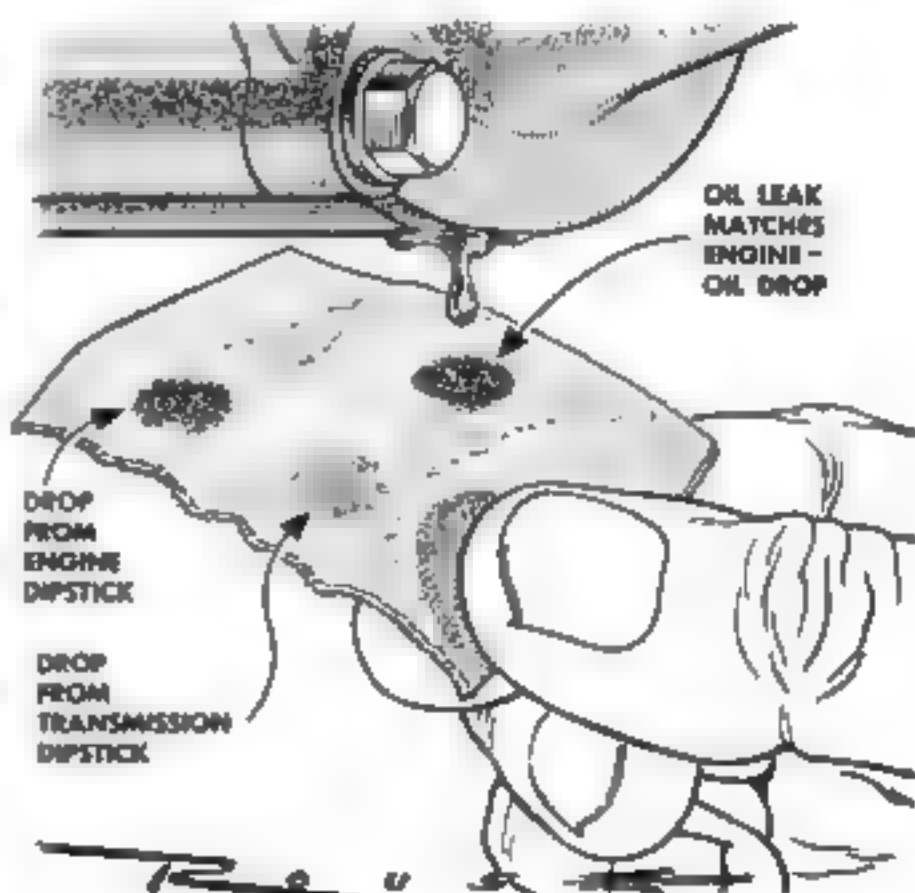
Flush dirt from the underside of a car without getting yourself wet by clamping the hose to a dolly made from a 6' length of pipe and half a roller skate. Bolt the skate to the pipe and bend up a handle. To avoid a geyser, turn on the water *after* pushing the dolly under the car.



Get a better grip on the handle of a screwdriver by tightening a worm-gear hose clamp around the handle near the shank of the blade. Grasp the tool so that your thumb bears against the clamp screw in the direction you're turning.



These car screens roll up for compact storage when not in use, yet they can be installed in minutes. Tack plastic screen to an upper and lower spreader shaped to fit the contour of the window. Insert a strip of wood to stretch the screen and secure it by raising the window against it.



To locate an oil leak, pull the dipsticks from engine and automatic transmission and let a drop of oil from each fall on a white blotter. Then hold the blotter under the car to catch a drop of leaking oil. Compare the colors.

Threaded rod available at your hardware store gives you both economy and convenience. It's like—

Buying Bolts by the Yard

By John Burroughs

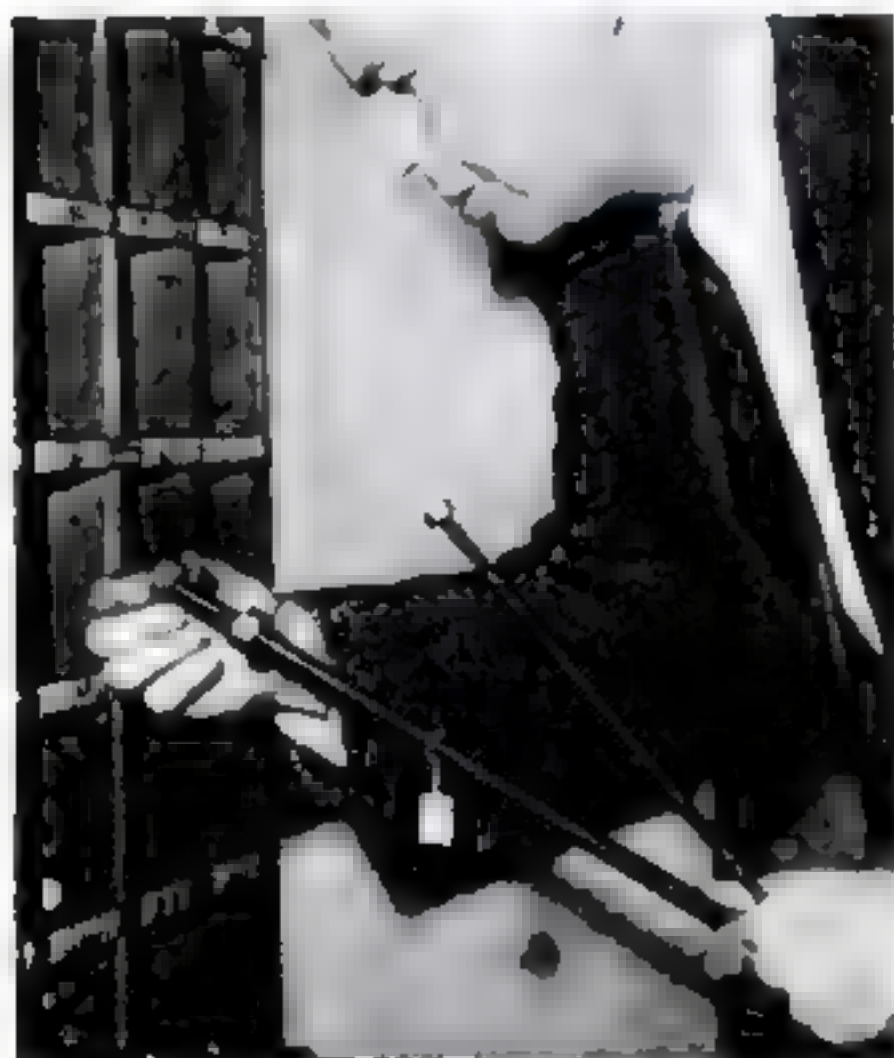
EVER tried to buy a long bolt? Big-city hardware suppliers stock them, of course. But suppose you walk down to the neighborhood hardware store looking for some bolts, say, 7" long and about as big around as your little finger. You'll settle for any kind—round-head, flathead, machine, carriage, any that are 7" long. You want to hang a heavy cabinet on the wall of your garage with bolts through the studs.

Nope, says the storekeeper, nothing longer than 6". How come? He has to buy bolts from his jobber in box or gross lots, and a collection of outsized bolts would kick around the store unsold for years.

But he *does* have a rackful of threaded steel rod. Threaded their entire length.

Your problem's solved, for one of these threaded rods is a handy-dandy, all-in-one, do-it-yourself bolt kit. You simply chop off lengths to suit yourself with a hacksaw, and screw on standard nuts.

One widely available brand comes in both 24" and 36" lengths in diameters from $\frac{1}{8}$ " through $\frac{3}{4}$ ". The stock is cold-drawn low-carbon steel, the finish either



PICK UP A SUPPLY OF NUTS AND WASHERS when you buy threaded rod at your hardware store and you'll always have exactly the right ones on hand for the job you plan to do.

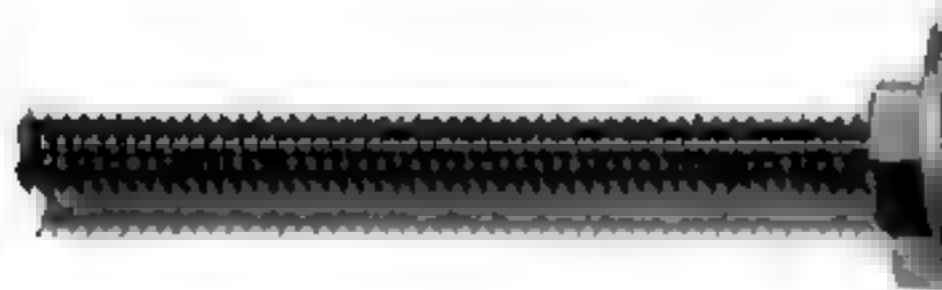


WHACK OFF ANY LENGTH that you happen to need. Screw a pair of hex nuts on the rod to keep the vise from mashing the threads when it's cut. Unscrewing nuts cleans the thread.

IT'S EASY TO BEND threaded rod to make, for example, special muffler clamps or hot-air duct hangers. Small-diameter rod bends cold. Heat heavier stock cherry red with a torch.



Want to clinch a job? This rod makes it a cinch



blue-coated or zinc plated. Threads are the familiar kind, national coarse.

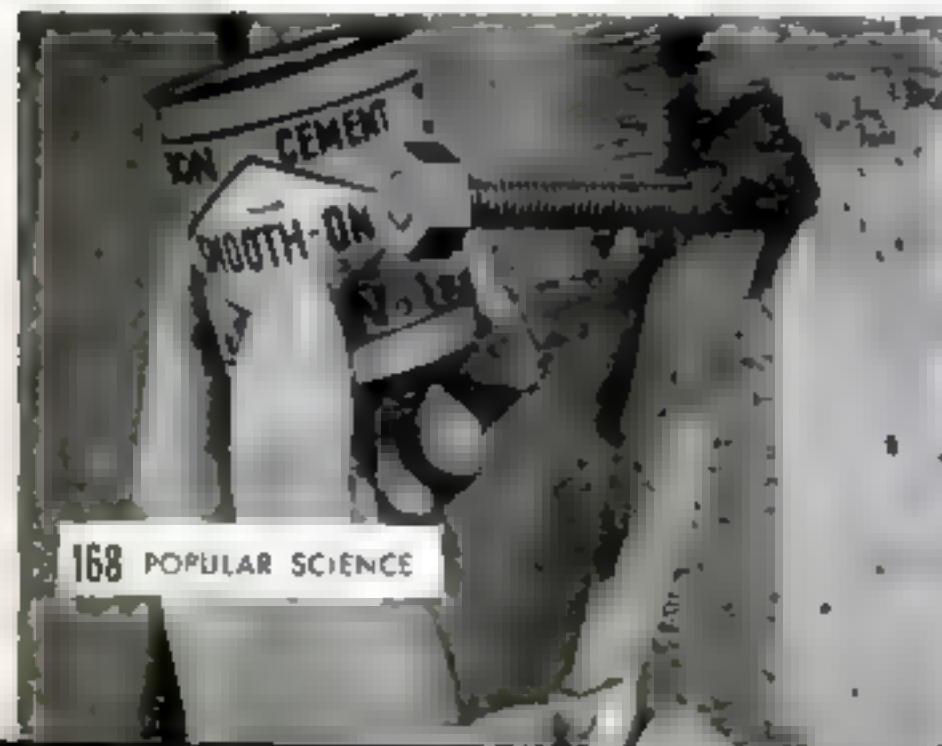
Besides affording a convenient supply of odd-length bolts and studs, ready-threaded rod lends a multitude of fastening, clamping, bracing and hanging jobs that ordinarily call for lathework or tap-and-die threading.

On farms, for example, threaded rods are marvelous for machinery repair. Builders use them to anchor sills. Machinists find them cheaper than stopping to set up a screw-cutting lathe. Pipe fitters use them to bolt flanges. Contractors use them to hang fluorescent lamp fixtures, air conditioners and industrial equipment.

These commercial uses will suggest ways to use threaded rod around your own home. The accompanying pictures show a few more possibilities.

Considering their low cost, it's a good idea to salt a few rods away in your tool cabinet against emergencies

TO MOUNT WOODEN CABINETS or shelves on concrete walls, set short studs cut from threaded rod in the concrete. Drill holes in the concrete with a carbide-tipped masonry bit and bed the studs snugly in iron cement.



ONE-EVENING BOOKSHELVES are a cinch. Use threaded rod and tubing—aluminum, brass or perhaps steel conduit. Shallow counterbores in the wood around the rod position the tubing spacers. Apply black lacquer to the shelves.

ORCHARDISTS USE THREADED ROD to save fruit trees when a limb tends to split off. It has been found that boring holes through large limbs doesn't injure them. Twisting wire around them can cut the bark and kill the tree.



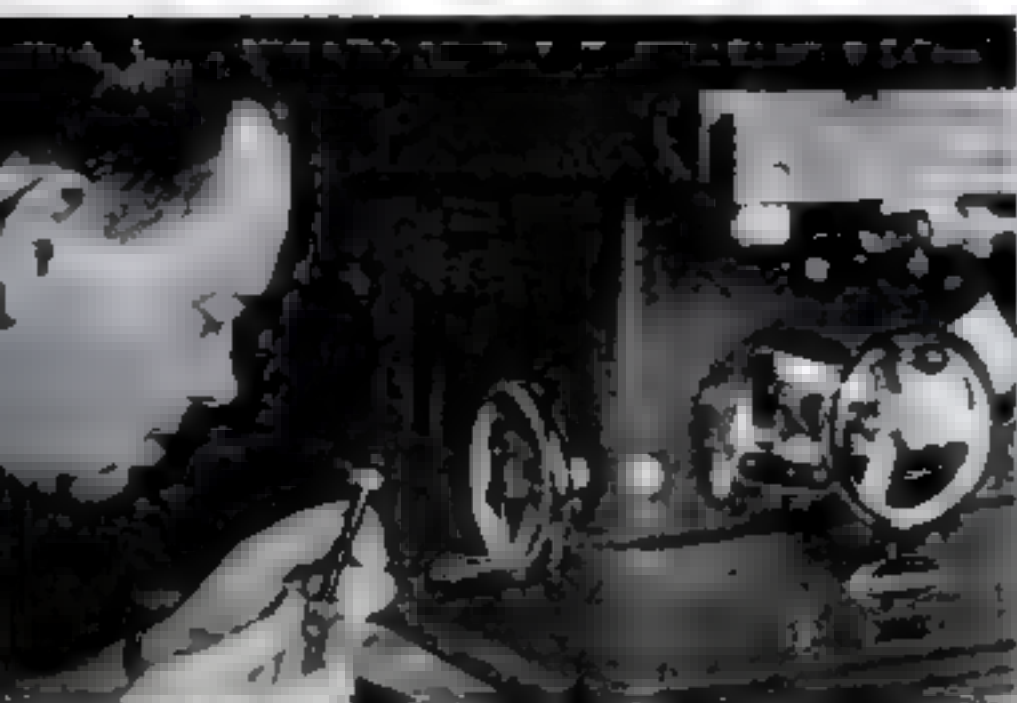


FOR A SOLID WORKBENCH TOP, glue and bolt together old oak flooring, bought in bundles at a salvage building-materials lot. Bore lengths of flooring, brush them with resin glue, then string them on threaded rod and bolt them

together tightly. Along both edges glue oak strips counterbored to cover the nuts and washers. Finally, sand the top and ends smooth with floor-sanding disks, fill any nail holes, and finish the surfaces with resin floor-hardener.

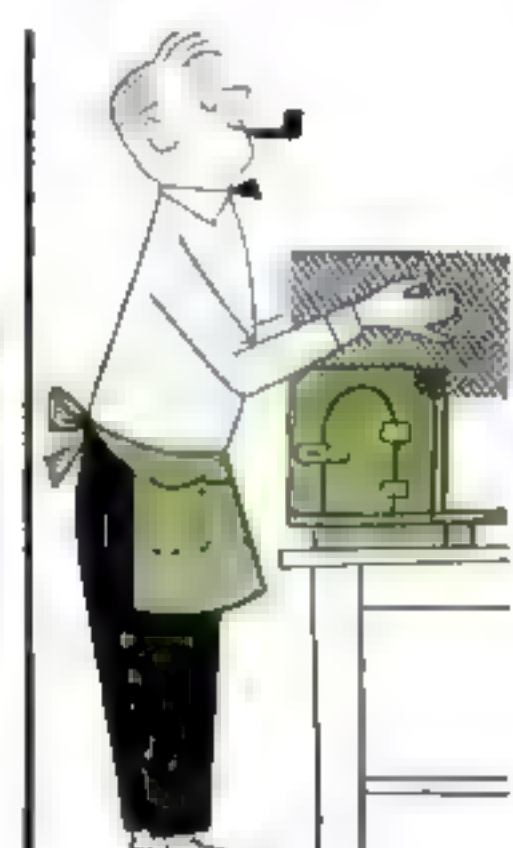
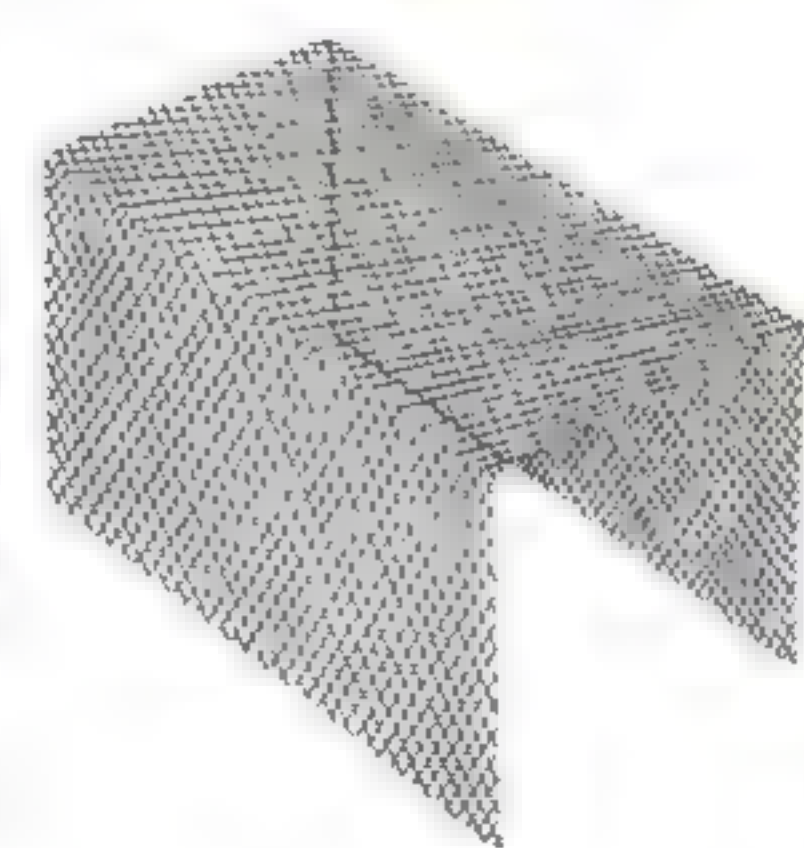
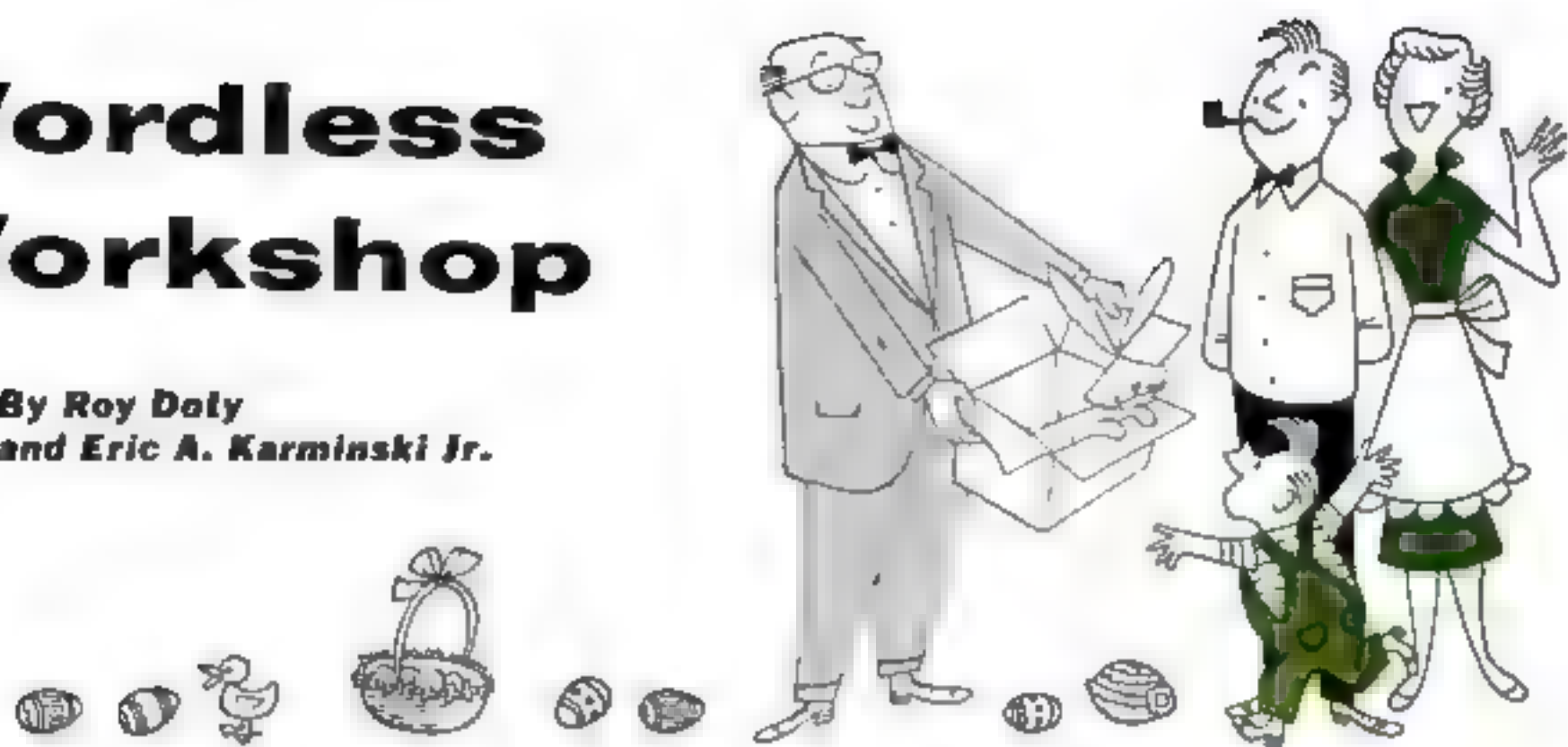
THE RIGHT BOLT never seems to be on hand for a job like this—mounting a power tool on a bench or stand. Having $\frac{3}{8}$ " threaded rod around the house saves you a trip. Rod is available in diameters from $\frac{1}{4}$ " through $\frac{3}{4}$ ".

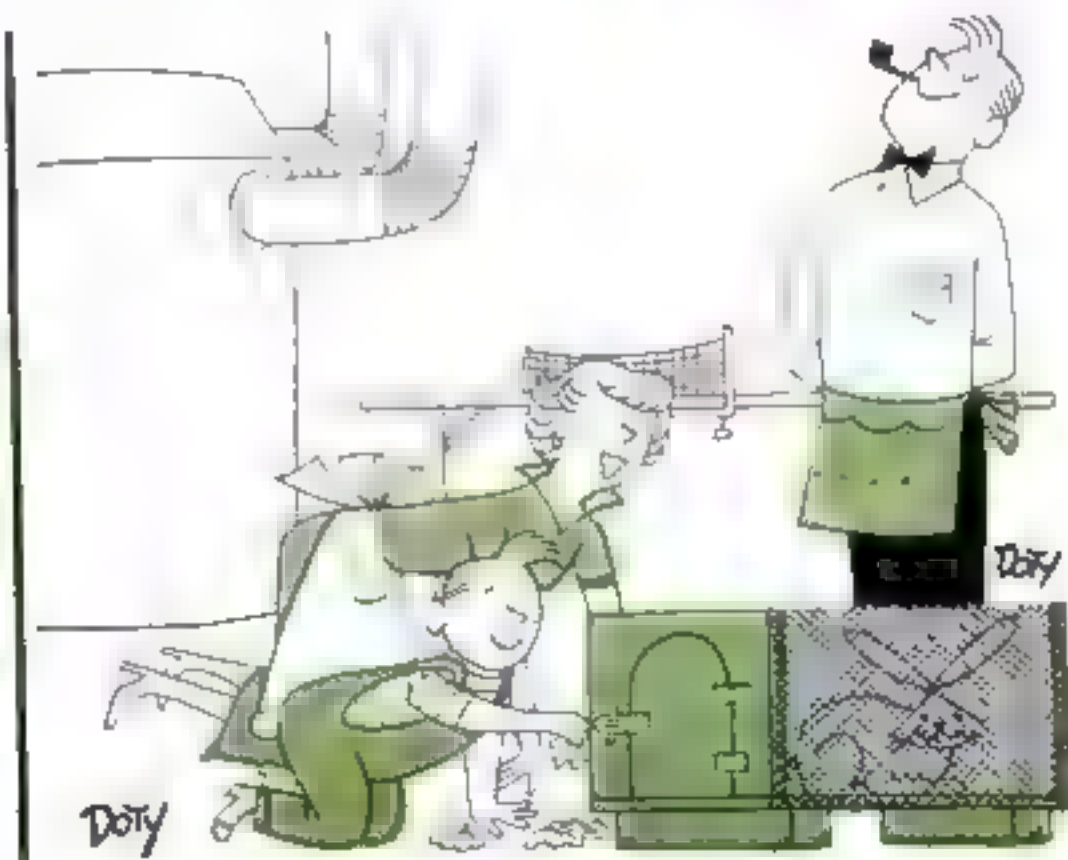
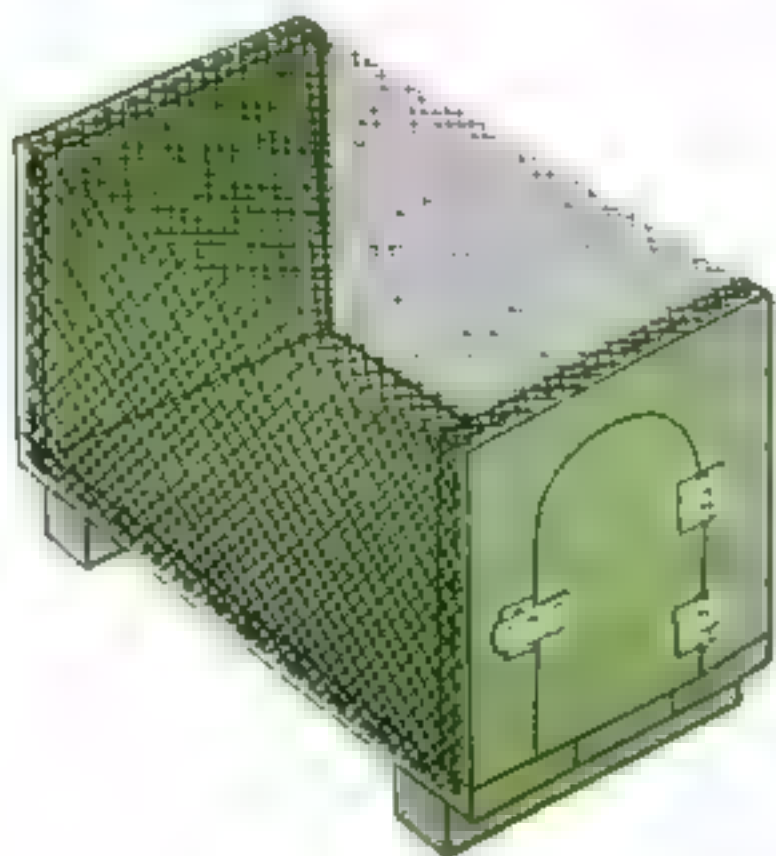
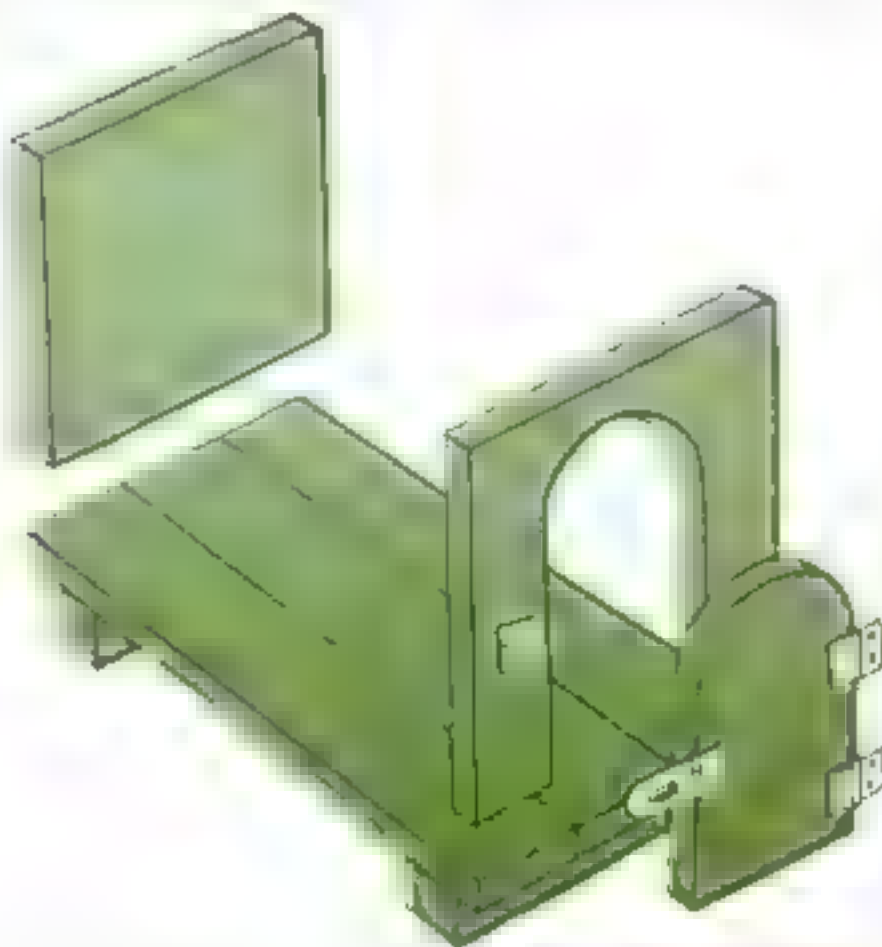
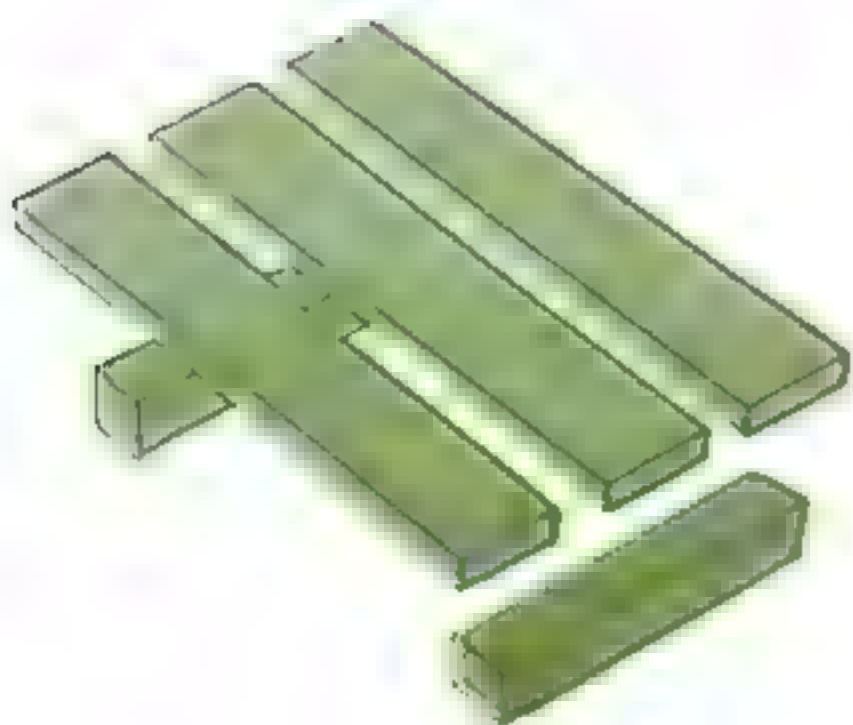
WHEN EDGE-GLUING WIDE STOCK, spare $\frac{1}{2}$ " threaded rods will come in handy as light-duty cabinetmaker's clamps. Bore holes in pairs of hardwood blocks, and tighten them against the work with wing nuts. END



Wordless Workshop

By Roy Doly
and Eric A. Karminski Jr.





Next Month: A baler that stores and bundles newspapers neatly

Why Your Car

Enemy No. 1: sludge caused by stop-and-go driving. Can you do anything about it? Yes.

By Wesley S. Griswold

YOUR loving wife is your car's worst enemy. In her daily jaunts to market, to visit friends, to pick up the kids, to trundle you to and from the station, she is innocently giving the family bus its hardest wear.

No matter how expert at the wheel, she is still guilty of stop-and-go driving, the chief source of premature aging in engines. If your car needs an overhaul this spring, that is the most likely reason.

You can comfort your wife with the assurance that she shares her guilt with millions of other drivers, including you. Seventy-five percent of all automobile trips in the U.S. cover less than 10 miles; 50 percent, no more than four miles.

Another name for stop-and-go driving is low-temperature driving. That name pinpoints the core of the trouble. Today's automobile engines and most motor oils perform best at high temperatures, the kind generated by prolonged journeys at brisk speeds. In the myriad short trips that most American drivers take, the motor and the oil never get really warmed up. This tepid running condition sets off a whole train of misfortunes.

Stop-and-go driving is most damaging in cold, damp weather—the colder the climate, the more acute the problem. But there's dirty work afoot even in summer.

Here is what happens in your car's engine on a chilly April day in, say, Maine or Wisconsin or Washington. The temperature of the air is around 38 degrees, but the humidity is high and the day feels much colder than it is.

Your wife starts the car and heads for her favorite supermarket. Gasoline mixed with air at the carburetor is enter-



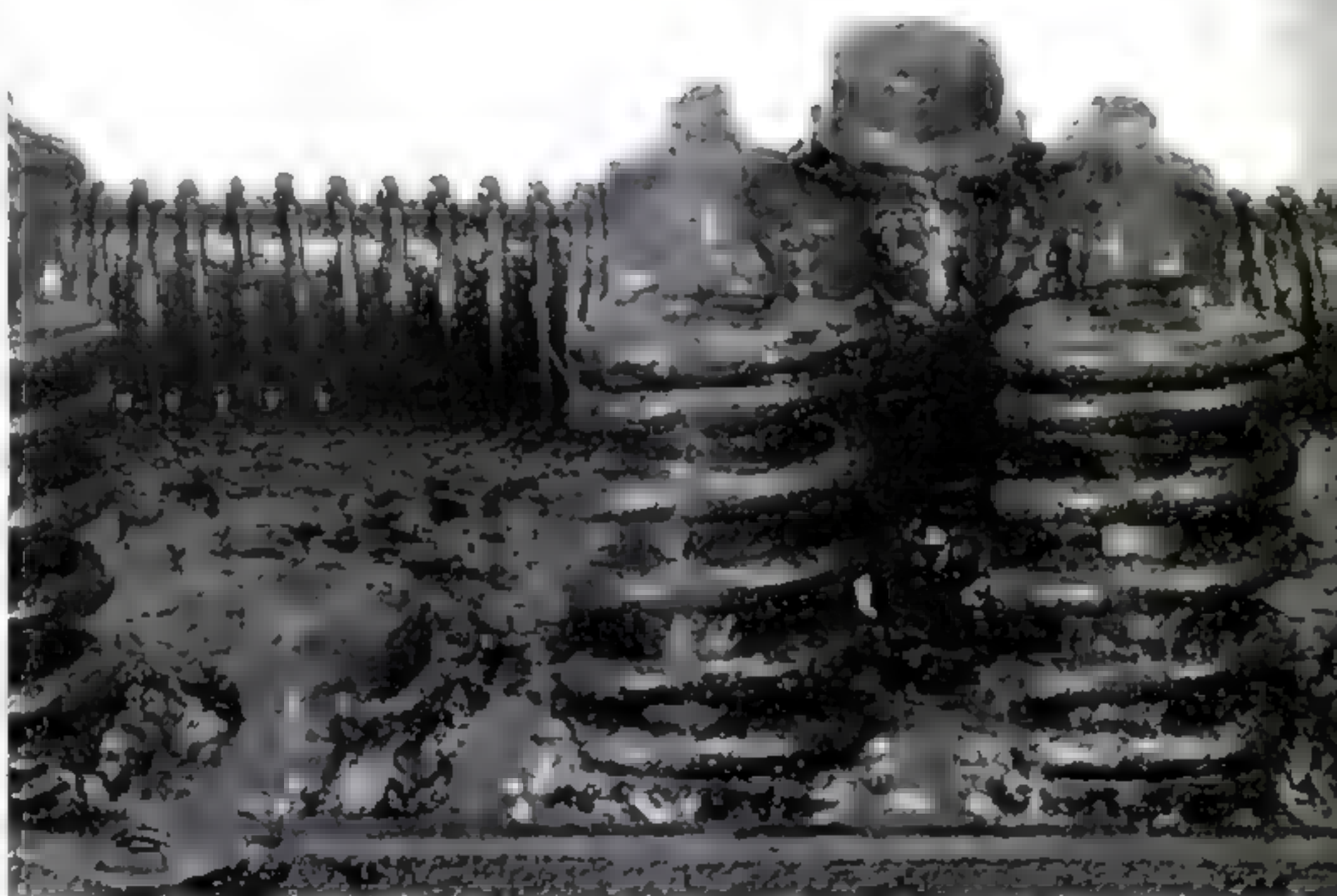
TYPICAL EXAMPLE of the engine problems created in stop-and-go driving is this soup of sludge

ing the intake manifold. As the fuel evaporates in the air stream (1,000 gallons of air are drawn into the carburetor for each gallon of gasoline consumed), the air-fuel mixture instantly chills 40 to 50 degrees. This frigid draft then hits the hot spot—an exhaust-heated stove—which should be heated to at least 125 degrees to vaporize the mixture properly.

The first trouble with stop-and-go driving is that the hot spot rarely gets hot enough to do its job well. This is especially true of older cars, for their hot spots are likely to be clogged with rust and exhaust products.

As a result, part of the fuel doesn't vaporize. Raw gasoline runs down the intake manifold and hits the hot undersides

Engine Grows Old



found covering the rocker-arm assembly of one car. It has been estimated that in 30,000 miles

of this type of driving, around two pounds of sludge collects on various engine parts.

of the intake valves, where it stews and forms carbon. Moreover, it flows into the cylinders, where, being a liquid, it doesn't burn thoroughly. Soot from this incomplete combustion clogs the rings and also gets into the crankcase, to form one of the ingredients of sludge. It also gets on the piston skirts to form "varnish"—a brew that is tacky at first and then, as it ages under heat, grows into a hard coating on the pistons. This coating can substantially increase piston friction, robbing the engine of power. In severe cases, varnish may even cause an engine to "seize" or stop dead and refuse to turn over.

Some of the raw gasoline that sneaked past the hot spot, together with moisture

from the damp outside air, water formed by "cold" combustion, and condensed acid vapors from the chemical reactions in combustion, reaches the crankcase.

If the crankcase oil isn't heated to at least 140 degrees (and preferably to from 180 to 225 degrees), which would be hot enough to vaporize these unwelcome newcomers and drive them out the crankcase's breather pipe, the new arrivals combine with particles of dust and soot to form sludge. At first the sludge is like black mayonnaise, but it soon hardens and starts to clog the oil screen.

The second trouble with stop-and-go driving is that the crankcase oil seldom warms up to 140 degrees or better. Thus

the formation of sludge goes merrily on.

When engines have accumulated a lot of sludge, oil passages may become clogged. Your car's engine then begins to be starved of oil. Most serious results: Bearings overheat and fail, piston rings fail, pistons get noisy.

Sludge also gathers on the timing chain, where it interferes with lubrication and speeds wear. It fouls finely fitted hydraulic valve lifters. It stifles the flow of oil to the valve rocker arms, causing them to wear rapidly, squeak and clatter loudly. It gathers around the push rods, speeding up their rate of wear, and clogs the oil-control rings on the pistons. When that happens, your car can burn oil at an alarming rate.

The third trouble with stop-and-go driving is that it frequently produces spark-plug fouling. This, in turn, promotes the formation of sludge. Here's how it works:

The temperature of a spark plug's nose should be at least 1,000 degrees. If it is cooler than that, particularly harmful deposits collect. They are harmful because they are good conductors of electricity. Furthermore, the hotter they get, the better they conduct electricity.

In long, fast automobile trips, utilizing the higher horsepower of the engine, temperatures of the spark-plug noses range from 1,000 up to around 1,600 to 1,800 degrees. Deposits formed on the plug noses at those temperatures are of different chemical composition. They are as much as 10,000 times more resistant to electricity than the deposits formed when nose temperatures are below 1,000 degrees.

In stop-and-go driving, particularly with old plugs, the noses of the spark plugs seldom get as hot as 1,000 degrees. The harmful deposits collect. You may

not be in difficulty as long as you drive slowly, but if you suddenly want to make a quick getaway from a traffic light, the chances are that one or more of the plugs will misfire. The spurt of speed has abruptly raised the tempera-

ture of the spark-plug noses, heating the deposits there until they conduct electricity so well that they leak it off to ground and prevent a spark.

When a spark plug misfires, the fuel mixture fails to ignite, and the cylinder cools off. This contributes an extra dose of unburned fuel and condensed vapors to the sludge factory in the crankcase.

A fourth trouble

with stop-and-go driving arises from the fact that an unwarmed engine manufactures several corrosive acids, plus an astonishing amount of water (about a pound of water for every pound of gasoline burned). When an engine is allowed to get hot and stay that way, the corrosive liquids are vaporized, do little harm. When the engine runs in short stretches but rarely gets warm, the acids corrode rings and cylinder walls, and also eat into the metal of the muffler and exhaust pipe.

If circumstances force your family to be a brood of stop-and-go drivers, there's little you can do about it. There are, though, some things you can do to minimize the harm.

1. Use oil-change intervals that are based on the type of mileage that the car is accumulating. Some auto makers, Oldsmobile for example, advise changes as often as once every 500 miles under cold-sludge conditions.

2. Use motor oil having the American Petroleum Institute's classification "MS." This type of oil was specially designed by motor-oil researchers to help with the problems of stop-and-go driving, and it

[Continued on page 238]



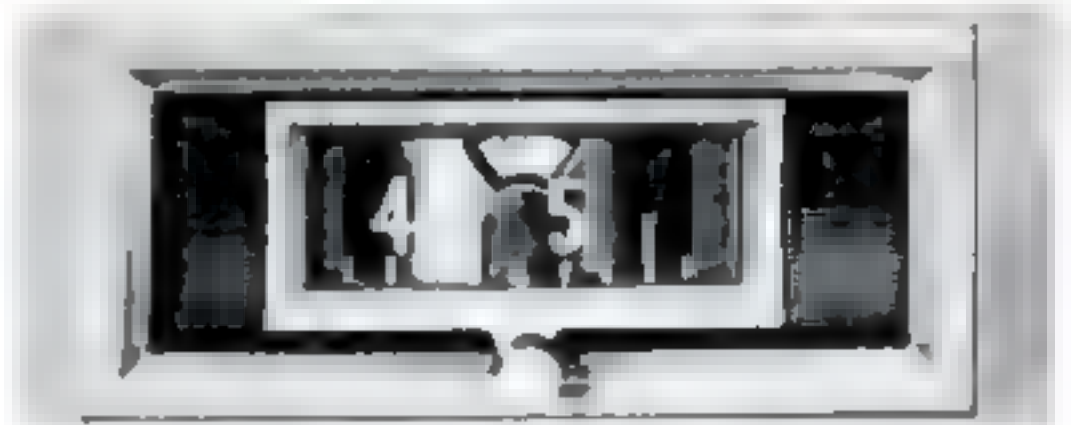
DRAMATIC CONTRAST in the condition of valve springs shows the result (right) when an engine has been prepared to withstand effects of stop-and-go driving.

New for Your Car



1. Sleeping Bag Fits in Wagon. This combined mattress and bag is made of nylon and filled with a mildew-proof

fiber. It fits any station wagon, and has space for two adults or three children. It rolls up to fit into a 16"-by-26" case.



2. Drum Clock Mounts on Dashboard. You read this clock, developed for 1957 Cadillacs, directly from its rotating drum. A regulator adjusts clock speed automatically at each resetting.

3. Spin-On Filter Speeds Change. With a filter like the one at left, you make a replacement by spinning the old unit off its threaded mounting stud and spinning on a new one. No tools are needed. It is factory equipment on all 1957 Ford-made cars and trucks, and can be installed with an adapter on older Fords, and on Buicks, Oldsmobiles and Pontiacs having full-flow filtration.

More information about these new car products can be obtained from: 1. Inlee Computer Mfg. Corp., Holyoke, Mass.; 2. Westclox, La Salle, Ill.; 3. Wix Corp., Muskegon, Mich.

Washing a House

A few dollars and a day's work with a garden hose, hose brush

By Bernard Gladstone

THE next time you think about painting your house, stop and ask yourself whether a good washing wouldn't do instead. Is it really time for another coat of paint? Or would you be doing the job just to hide accumulated dust and dirt?

Too much paint on a house can do more harm than good. Laboratory tests

have shown that it is best to delay repainting surfaces until the last coat has almost worn through. (A good paint job usually lasts five or six years.) This keeps the film from building up to an excessive degree over a period of years—a danger that may eventually cause cracking and peeling because of the sheer weight of accumulated paint.

Most exterior house paints are designed to chalk away gradually at the



Saves Painting

and detergent can make your home look as fresh as spring.

surface. As the paint chalks, the wind and rain are supposed to carry away the dirt, thus keeping the paint looking fresh and clean year after year.

A helping hand is frequently needed to carry the chalking process along, however, especially on sheltered parts of a house. A thorough hosing down will sometimes make everything look new again. But for a really sparkling job, you may have to give the entire house

a washing. The job can be done on most houses in less than a day. Work one side at a time, and, as in painting, avoid the sun as much as possible during hot weather. Start on the shady side and follow the sun around.

Wet down an entire wall first—with your hose turned on full. Adjust the nozzle to give the strongest possible jet. Pay particular attention to sheltered areas under eaves and gable ends, and to the bottom of the walls along the foundation.

In many communities a lot of the dirt will be mixed with soot or other oily residues. The resultant grime tends to shed water and will not flush away easily with just plain water. When this is in a high area, squirt on some detergent to dissolve the dirt and to act as a wetting agent. The easiest way to do this is to use a siphon type sprayer sold in garden-supply stores for spraying trees and tall shrubs. These hook on the hose and draw the liquid concentrate out of a bucket or attached glass jar. This will be diluted by the water from the hose, so mix a highly concentrated solution in the jar or bucket. Use a detergent that is recommended for painted surfaces.

Squirt on only as much detergent as you can hose off with plain water before it dries. Make sure that areas below have been wetted down so the detergent won't run down and stick on.

Even a detergent won't always get rid of all the dirt. In that case, use a hose brush of the type commonly sold for washing windows or automobiles. These have a hollow handle and screw on the end of the hose. At least one model has an automatic detergent dispenser in the handle, and you can have your choice of detergent-laden water or clean rinse water. Wet the stained area first. Then scrub vigorously with the water turned



TO INCREASE YOUR REACH with a hose brush, splice on a tube or broom-handle extension as shown above. Secure it by wrapping tape at intervals around the regular handle and hose.

SCRUB DIRTY SCREENS on a level surface. If yours have copper wire, coat both sides with spar varnish to guard against oxidation. This will minimize stains on paint below windows.



[Continued on page 252]

APRIL 1957 177



NEW BONUS FEATURE

TEAR OUT THIS BOOKLET



TO REMOVE
the booklet, place
your left hand firmly
on this page of the
magazine, grasp the
booklet with your
right, and give the
booklet a quick yank.
This will free it
from the single
staple that binds it
into the magazine.
Then, if you wish,
you can trim the
projecting edge with
a pair of scissors.

Now... start your

Popular Science Reference Library

Popular Science now makes it easy for you to save valuable how-to information. This month you get No. 1 in the new Popular Science Reference Library. Just pull the booklet out of the magazine and save it until you need it. Each booklet will be devoted to a subject of high practical interest to you. This month's is about wood.

It clears up confusions that sometimes skyrocket a bill for home improvements. Future issues will contain similar time-saving, money-saving data on other important subjects.

NEXT MONTH: How to Buy a New Car

Here's a quick and easy way to build a—

Hi-Fi Speaker Enclosure

WANT hi-fi quality in a speaker enclosure with a minimum amount of cabinetwork and expense? You can build this one in an evening, using less than three dollars' worth of materials. The wall corner becomes an integral part of the sound box for an 8" speaker.

The enclosure is a bass-reflex type. Dimensions, including those of the vent neck, have been carefully computed to give the best acoustical results. So stay with them.

Start by cutting the front, top, bottom and vent neck from $\frac{3}{4}$ " particle board (I used Novoply). Jigsaw a 7"-diameter speaker opening centered 20" above the bottom of the front panel.

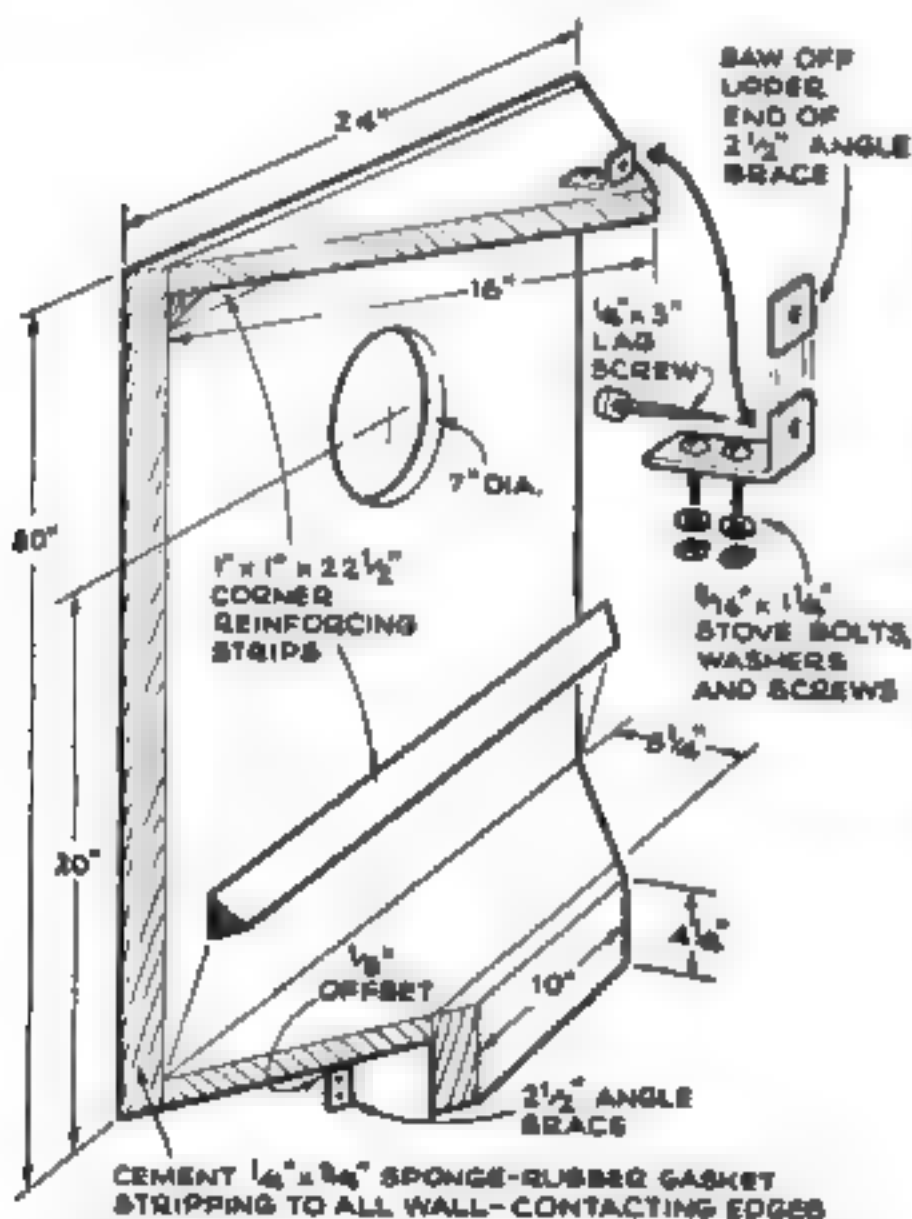
Great strength is not a must in this wall-supported enclosure, so it isn't necessary to use woodscrews for the assembly. Instead, use one of the new, quick-setting thermoplastic glues and 6-penny finishing nails. Reinforce the top and bottom joints with glue strips.

Tack two thicknesses of molded pulp-board egg cartons to all inside surfaces of the enclosure except the vent neck. Crush each bump slightly to





CHEAPER THAN GLASS FIBERS OR FELT, pulp-board egg-crate trays tacked to the inside reduce resonance just as effectively. Wall sections behind the enclosure need no lining.



PARTICLE BOARD IS BEST for the enclosure. (Plywood could be used, but it has less satisfactory sound-damping characteristics.) Assemble the enclosure parts with glue and brads.

make these damping surfaces as uneven as possible. For good sound, too, the enclosure must fit snugly against the room walls. To insure a tight air seal, face all wall-contacting edges of the particle board with gaskets made from sponge-rubber weatherstripping. You can get this at an auto-supply store. You'll need 10' of the $\frac{1}{4}$ "-by- $\frac{3}{4}$ " size, or 19' (using two widths) of the more commonly stocked $\frac{3}{8}$ " width. Attach the gasketing to the enclosure edges with a beading of rubber cement.

For wall supports use three $2\frac{1}{2}$ " angle braces. Place them as shown in the drawing, using stove bolts to attach the upper one to the enclosure top, and woodscrews for the two lower ones. As the sketch indicates, part of the upper bracket is sawed off and the remaining screw hole should be reamed to $\frac{1}{4}$ " diameter to take a lag screw.

Tack grille cloth across the back of the speaker opening and mount the cone. Attach the speaker leads, which can be either threaded out through the vent or concealed in the wall. Then prop the enclosure in position in the wall corner, preferably at a height that places the speaker opening about 5' from the floor. Spot hole locations on the wall through the screw holes in the angle braces.

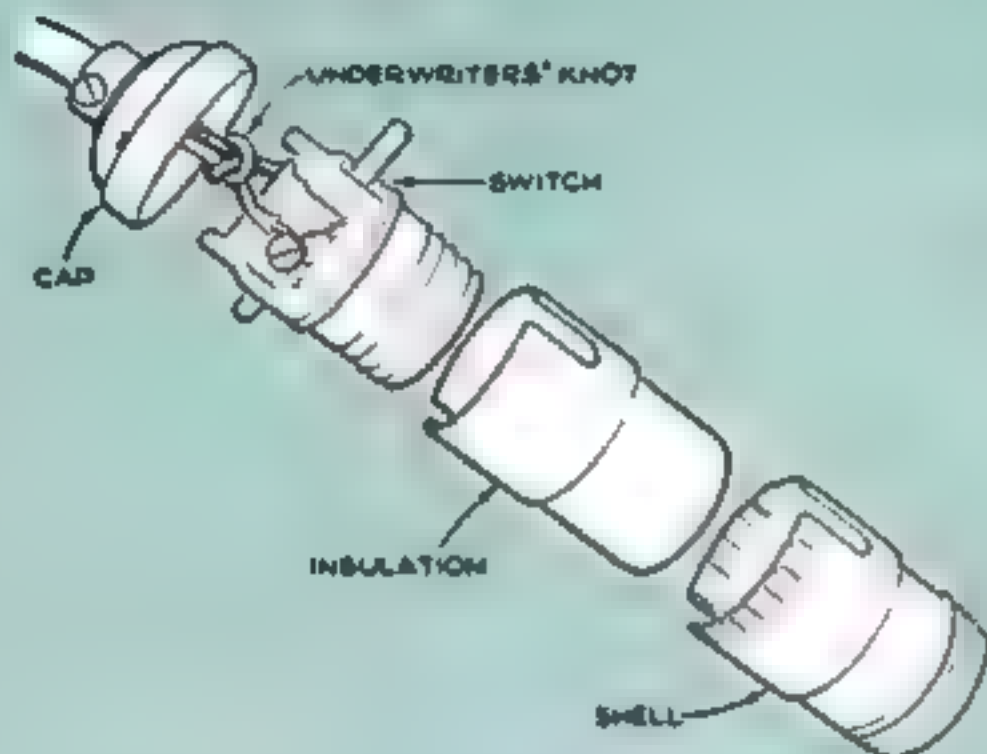
If the walls are of wood, bore pilot holes for a lag screw at the top and flat-head woodscrews at the bottom. On plaster walls use a lag screw at the top and screw anchors at the bottom. Either way, mount the enclosure by first driving the lag screw loosely, then fastening the lower braces tightly to the wall, and finally drawing up the lag screw. Check the gasketing gingerly with a thin putty knife, to be sure it's tight all around.—*Tom Stevenson, Los Angeles.*

Save this reference sheet to use as a guide the next time you have a lamp cord to repair. It's one of a series of handyman aids that you'll find each month in **POPULAR SCIENCE**.

Next month: toilet tanks.

Popular Science Fix-It File

THE PARTS OF A STANDARD SOCKET



STANDARD PLUGS: Using these, you must bare ends of the wire.



SNAP-ON PLUGS make contact without any need to strip wire.

How to wire a standard plug



SEPARATE WIRES for about 3" by removing braid or splitting covering. Run cord through back of plug and tie on underwriter's knot (see other side of data sheet). With knife at angle to avoid cutting strands, bare $\frac{1}{2}$ " of

wire and twist the frayed ends. Pull cord to draw knot into plug hollow. Run each wire around a plug prong and twist around post clockwise so that the wire doesn't loosen when you tighten the screws.

How to wire snap-on plugs

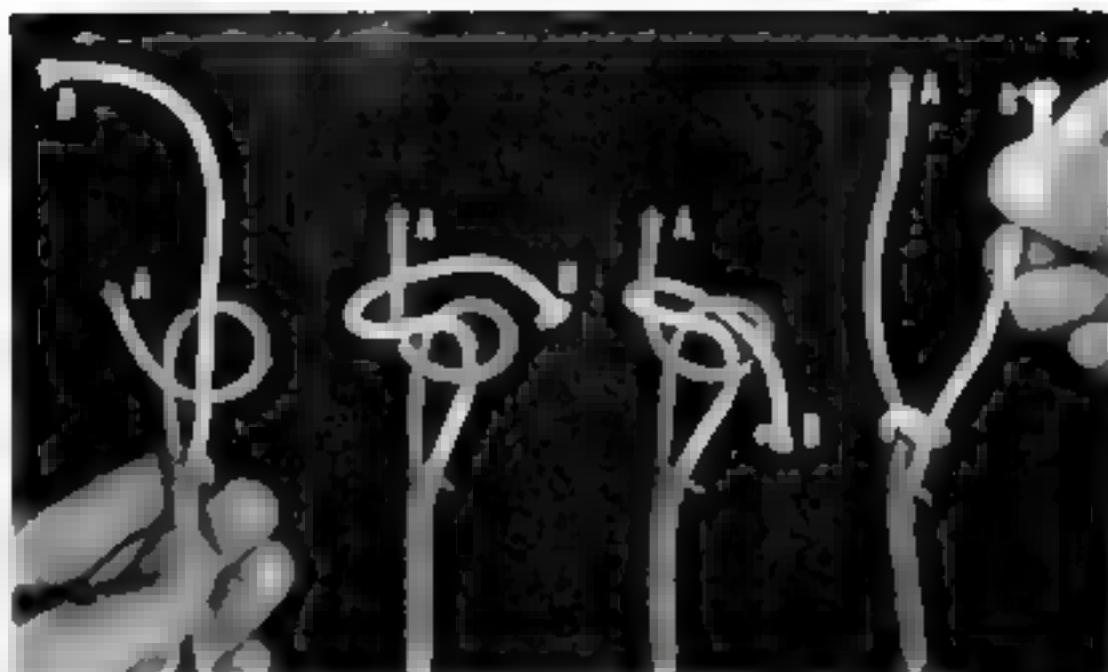
PRINCIPLE IS SAME in all types. You insert No. 18 flat cord into plug without baring insulation. Either closing plug or pushing a lever forces plug contacts through insulation to wires. Types shown (l. to r.) make con-

nections when cap is pressed back over jaws; when prongs are squeezed parallel and cap replaced; when cord is bottomed in hole at side of plug and lever depressed; when cap is screwed down over knives.



Underwriter's knot ties easily

LOOP WIRE "A" around wire "B" and back across itself. Swing the end of "B" around "A" and back of the loop. Thread the end of "B" back through the loop in "A". Draw knot tight. Knot takes strain off connections.



How to wire a lamp socket



SEPARATE CAP from shell by pressing screwdriver against shell, either beside switch cut-out, release slit or marked point on some

shells. Thread cord through cap. Tie Underwriter's knot. Secure bared wire ends clockwise to binding posts. Reassemble the socket.

How to replace or repair lamp cords



TO RUN NEW CORD through a lamp, remove base or base felt for convenience while threading cord. On a lamp with base switch, note hook-up with solderless connectors before disassembling.

PROTECT THE CORD against wear by taping it at the stress point where it enters the lamp base. For the neatest and strongest job, cut the tape into $\frac{1}{4}$ "-wide strips before applying it.

MEND FRAYED SPOTS in an old cord with tape. Plastic electrician's tape is best for this purpose. Wrap each of the wires separately, if they show signs of wear, before taping up the entire cord.

Planning to buy a home? The good points are easy to see, but you have to look hard to find the bad ones. Here are—

63 Tests to Rate Your Next House

By Carl Dreher

Is it a dream house—or a nightmare? Use this checklist to make a record of faults you can spot. If you can answer “No” to most of them, you may have a good buy; if you can’t, you’d better keep on looking.



FOUNDATION AND CELLAR

1 POOR DRAINAGE? YES ☐ NO ☐

A house below street level or one where the ground slopes toward it is likely to take water in the cellar. For best drainage, the ground should slope away from the house.

2 ROCKY GROUND? YES ☐ NO ☐

A high, rocky site can be as bad as a low one if there is a serious chance of injury to children.

3 FILLED LAND? YES ☐ NO ☐

Freshly “made” land, such as a filled-in swamp, may cause uneven settling of a house, resulting in cracked plaster, sticking doors and other troubles. Special piles or “spread” footings can prevent this, and a house may be a good buy if you can be sure from blueprints or a building inspector that such precautions have been taken.

4 STEEP DRIVEWAY? YES ☐ NO ☐

This can be a nuisance in snow or ice, but more serious is the danger of accident when you back out. A driveway that slopes toward the house may also channel water into the cellar.

5 FEW TREES? YES ☐ NO ☐

Aside from poor appearance, you’ll miss their shade, especially on the sun-beaten south and west sides of a house.

6 HEAVY TRAFFIC? YES ☐ NO ☐

Stay away from highways and heavily traveled town roads if you want a clean, quiet, safe location for children to play.

FOUNDATION AND CELLAR

7 CRACKS IN WALLS? YES ☐ NO ☐

Thin cracks and open mortar joints in foundation walls are easily patched, but long, deep cracks indicate uneven settling. In a new house, they spell more trouble to come.

8 UNFILLED CORE HOLES? YES ☐ NO ☐

A concrete-block foundation should have a top course of solid blocks or two top courses of regular blocks with the core holes filled with concrete. Check this with the salesman, builder or local inspector.

9 FLOODED CELLAR? YES ☐ NO ☐

A small puddle after a hurricane is not a fault, but if there’s much water when

you inspect the house, it's sure to come back when you buy it. If the cellar is dry, look for water marks on the walls that indicate previous flooding. On a warm, humid day water may collect on cold cellar walls. This is condensation, not seepage, and is not a fault.

10 SUMP PUMP? YES NO
☐ ☐

This is frank admission that a water problem exists. The pump may be able to handle it, but it may also fail you when you need it most if there's a power shut-down during a storm.

11 WEAKENED JOISTS? YES NO
☐ ☐

Check rotted-looking areas with a jack-knife. An occasional soft spot in old joists is all right, but if the blade penetrates an inch or two, the member will have to be replaced. If many joists are affected, you'd better not buy.

12 JACK POSTS? YES NO
☐ ☐

Some old houses have adjustable jack posts to shore up sagging joists. These are legitimate in small areas to help support heavy furniture or appliances, but not if needed to brace the entire floor.

13 SPLICED GIRDERS? YES NO
☐ ☐

Girder ends should butt on posts or walls, and nowhere else. Unsupported splice joints may eventually give way.

14 INFERIOR COLUMNS? YES NO
☐ ☐

Wood posts are not as strong as iron "lally" columns, but are acceptable if sound and made of solid timbers to avoid buckling. (The reverse is true of girders, which are strongest when built-up.) Watch, too, for posts that are sunk directly into concrete—they'll rot at the base.

15 ANY EVIDENCE OF TERMITES? YES NO
☐ ☐

Small, flattened tubes about the size of a lead pencil running along walls and in other places are a sure tip-off. But often termites are hidden in the wood and can't be seen. Jab spongy spots with a knife; see if they're hollow. Avoid houses that

are damp, have cracks and openings in the foundation, or are littered with scrap-wood. A termite-infested house may not be a bad buy if the seller is willing to cut the price enough to allow for repairs.

16 LOW CEILING? YES NO
☐ ☐

If you can't stand comfortably erect, you'll have to forget that basement workshop or playroom.

17 INACCESSIBLE CRAWL SPACES? YES NO
☐ ☐

Unexcavated areas must be 30" high or more to move around in easily for inspection and repairs. Cramped, damp, unheated and trash-littered spaces promote rot.

18 ABSENCE OF CELLAR? YES NO
☐ ☐

This is not a structural fault since many fine homes are built on slabs. But it may represent an important loss in extra work, play or storage space in a small house.

19 WOOD TOO CLOSE TO GROUND? YES NO
☐ ☐

You should be able to see 4" to 6" of masonry foundation all around the house. Wood close to or touching the ground provides an easy entrance for termites.

20 NEEDS PAINT? YES NO
☐ ☐

Paint that's worn but sound can be renewed, though at a price. You may have to figure on adding \$300 to \$600 or more to the cost of the house. Badly peeling paint is more serious because it may indicate that the walls are wet inside. If you can trace bad spots to definite leaks, these can be fixed; if you can't, the cause may be condensation—often incurable.

21 ROTTED SIDING? YES NO
☐ ☐

An occasional broken, warped or rotted shingle or clapboard is easily replaced. Widespread deterioration, if due to normal weathering, is not harmful, but will call for new siding, which is costly. Extensive rot in a recent house (20 years or younger) may be due to improper paint-

ing, inside moisture or other serious defects. Don't buy it.

22 **ROTTED WINDOW SILLS AND TRIM?** YES NO
☐ ☐

These can be replaced, but allow for their cost. Make sure, too, that they aren't sources of leaks.

23 **GAPS AROUND CHIMNEY?** YES NO
☐ ☐

Separation between an exterior chimney and the side of a house indicates that one or both are moving. If the gaps are small and the house is old, the movement has probably stopped and may not be serious. In a new house, they mean trouble.

24 **BULGING OR CRACKED WALLS?** YES NO
☐ ☐

Sight along the outside wall surfaces. You might accept a little unevenness in an old house, but not in a new one.

ROOF

25 **WORN-OUT SHINGLES?** YES NO
☐ ☐

If they look ragged, wrinkled, torn or curled, they're nearing the end of their life. Houses are successfully reroofed every 10 to 20 years, but you can figure on an extra \$500 or more to have it done.

26 **SAGGING ROOF RIDGE?** YES NO
☐ ☐

This is a major structural fault, difficult to correct and a sign of future trouble.

27 **COMPLICATED ROOF DESIGN?** YES NO
☐ ☐

Simple roofs, either flat or pitched, cost the least to maintain. Aside from necessary changes in level and direction, avoid a roof that's cut up just to make it "cute."

28 **ROTTED RAFTERS?** YES NO
☐ ☐

Look inside the attic for signs of rot. A single rafter can be replaced or strengthened, but extensive damage indicates serious leaks or an inside moisture problem.

29 **CORRODED GUTTERS AND DOWNSPOUTS?** YES NO
☐ ☐

Rust spots and holes can usually be seen from the ground. If they indicate that replacement is necessary, you will pay up

to \$100 or so for galvanized, considerably more for copper or aluminum. Wood gutters are considered the best-looking, but in time may leak and need to be lined.

30 **ABSENCE OF GUTTERS?** YES NO
☐ ☐

This is no longer considered a fault in many modern homes if drainage is good and gravel drain beds are installed around the foundation. But if drainage is bad, you may have to add gutters and dry wells.

TRIM AND JOINTS

31 **OPEN JOINTS IN TRIM?** YES NO
☐ ☐

These are the result of green lumber that has shrunk as it dried. You can patch them up, but other wood that doesn't show may also be green.

32 **HAMMER DENTS IN WOODWORK?** YES NO
☐ ☐

A good carpenter hits the nail, not the wood. Slipshod workmanship here may be a tip-off to poor quality elsewhere.

33 **STICKING DOORS AND WINDOWS?** YES NO
☐ ☐

You may find these in any house after a long, wet period that has caused wood to swell. But serious jamming may indicate high shrinkage or uneven settling.

34 **CRACKED PLASTER?** YES NO
☐ ☐

Small cracks are not unusual. Long, deep ones are likely to be due to structural defects that will worsen with age.

35 **WRINKLED WALLPAPER?** YES NO
☐ ☐

Wrinkles in the corners of walls may indicate a bad papering job—or, more seriously, uneven settling of the two walls. Look for other signs of settling.

36 **LOOSE OR BUCKLED WALLBOARD?** YES NO
☐ ☐

Green lumber often causes nails to pop out, leaving wall panels loose. A renailing job, requiring retaping, replastering and repainting, will not be cheap.

37 **WATER STAINS?** YES NO
☐ ☐

These are signs of leaks, often coming from some distance away. An occasional

leak, if found and fixed, won't harm a sound house. But if the owner hasn't been able to find them, you may not either.

38 SLOPING OR SPONGY FLOORS?

YES NO
☐ ☐

These are signs of settling, sagging or actual rot in a floor itself—all major construction faults. Don't buy.

39 BAD FLOOR PLAN

YES NO
☐ ☐

Avoid bedrooms strung in a series, so you have to pass through one to reach another, a bathroom too near to the living room, or a living room used as a passageway. If there's no separate dining room (a fault in an expensive house), make sure there's an adequate dining area.

40 SMALL ROOMS?

YES NO
☐ ☐

Watch out for tricks used to make rooms look larger, such as a mirror across one wall. Bare rooms also look larger than furnished ones. Take actual measurements to be sure what you're getting.

41 NARROW HALLS?

YES NO
☐ ☐

Hallways and stairs less than 31" wide will make it hard to move furniture.

42 STEEP STAIRS?

YES NO
☐ ☐

Stair risers should not exceed 8", or climbing will be difficult and dangerous.

43 INADEQUATE STORAGE?

YES NO
☐ ☐

One tiny closet to a room isn't enough. Double-width closets are now considered standard for most new homes.

44 LOW CEILINGS?

YES NO
☐ ☐

Ceilings under 8' high are undesirable except in old houses where you may settle for 7½' but no less.

KITCHEN AND BATHROOM

45 LESS THAN TWO BATHROOMS?

YES NO
☐ ☐

Once a luxury, a second bath is now considered a necessary convenience, especially for growing families. Even if you

don't miss it, the next buyer may. Two-story houses should have at least one bath on each floor.

46 OLD-FASHIONED FIXTURES?

YES NO
☐ ☐

These can be replaced, but will cost you \$300 to \$600 for a bath, up to \$1,000 or more to remodel a kitchen. An old or faulty tile job may cost about \$100 to replace. Sheet-metal shower stalls, while serviceable, are noisy, look tinny and are objectionable to many buyers.

47 POOR VENTILATION?

YES NO
☐ ☐

A bathroom must have either a window or ventilating fan to get rid of moisture. An exhaust fan is also standard in today's kitchens, though not in older houses.

48 ABSORBENT WALLBOARDS?

YES NO
☐ ☐

Soft wallboards quickly absorb moisture, grease and dirt if used in kitchens or bathrooms. Used anywhere, they are easily dented and do not stand up well.

49 SMALL RANGE OR REFRIGERATOR?

YES NO
☐ ☐

Most people consider a 42", four-burner range minimum size for family cooking. A refrigerator does not usually come with a house, but there should be space for at least a nine-cubic-foot size. If you're going to want a dishwasher, be sure there's a place for it.

50 POOR KITCHEN PLAN?

YES NO
☐ ☐

Have your wife make some trial motions to be sure that sink, range, refrigerator and work space are conveniently arranged. Watch out for cabinets that are too high to reach easily and too many doorways that interrupt the work flow. Open-plan kitchens look modern, but let odors and grease spread to other rooms.

51 NOT ENOUGH COUNTERS AND CABINETS?

YES NO
☐ ☐

You should have at least 7' to 10' of counter space, including cabinets underneath. Four good-size wall cabinets—two for foods and one each for dishes and glassware—are minimum.

INADEQUATE LIGHTING?

YES NO
☐ ☐

The single overhead fixture is not enough, though it's still found in most homes. A well-illuminated kitchen has separate lights over sink and range, and may also have them under the cabinets.

OLD-FASHIONED FURNACE?

YES NO
☐ ☐

In general, it's best to look for a modern oil- or gas-fired furnace with either forced-air or hot-water circulation. Old gravity-air systems, hand-fired coal furnaces and coal furnaces converted to oil may eventually give you trouble.

LOW CAPACITY?

YES NO
☐ ☐

Even a modern system can be undersized for the house. Find out if it heats all rooms evenly and easily, particularly if there's a second floor. If you plan to add heat to an attic or other area, be sure the furnace has the extra capacity.

55 HIGH FUEL BILLS?

YES NO
☐ ☐

A well insulated, average-size house (1,000 to 1,500 sq. ft.) may cost from \$140 to \$200 a year for oil, somewhat more for gas (except in natural-gas areas). Bills that run substantially higher warrant further checking.

60 WEAK DRAFT?

YES NO
☐ ☐

Soot around a furnace or rumbling on a start-up are signs of a weak draft. You may have to install a blower to improve it.

NOT ENOUGH HOT WATER?

YES NO
☐ ☐

The 30-gallon water heaters found in some homes usually aren't big enough. For an average family, you'll want an 80- to 100-gallon unit.

58 INADEQUATE INSULATION?

YES NO
☐ ☐

New homes in cold climates should be fully insulated (walls and either ceilings or roof); older houses may not be, and their heating bills will tell how serious a

fault this is. Insulation 1" thick is not as effective as 2" or 3", but may be adequate. Loose fill-type insulation (the cheapest) is more likely to absorb moisture and deteriorate than batt or foil types that incorporate a moisture-vapor barrier. Ceiling insulation is fine if the attic is not to be heated; if it is, the insulation should be in the roof.

COLD WALLS?

YES NO
☐ ☐

If you can feel a marked difference in temperature between an interior partition and an outside wall on a cold day, that's a tip-off to inadequate insulation. A house with cold walls will be uncomfortable even if you overheat it.

NO STORM WINDOWS OR WEATHERSTRIPPING?

YES NO
☐ ☐

You can figure on several hundred dollars if you have to add these.

OLD PLUMBING?

YES NO
☐ ☐

Iron pipe in an old house tends to clog and will eventually reduce water pressure seriously. Turn on the faucets, especially in second-story bathrooms, to test the pressure. If it's low, new plumbing will be expensive to install. In new homes, you should find copper plumbing.

62 NOT ENOUGH POWER?

YES NO
☐ ☐

A 60-ampere circuit, with only four branch circuits, is not adequate for today's lighting and electrical needs. Don't settle for less than a 100-ampere circuit with eight branch circuits. Still better is a 150-ampere circuit with 12 lighting circuits and a number of high-amperage appliance circuits. (You can tell the number of branch circuits by the number of fuses in the fuse box.)

NOT ENOUGH OUTLETS?

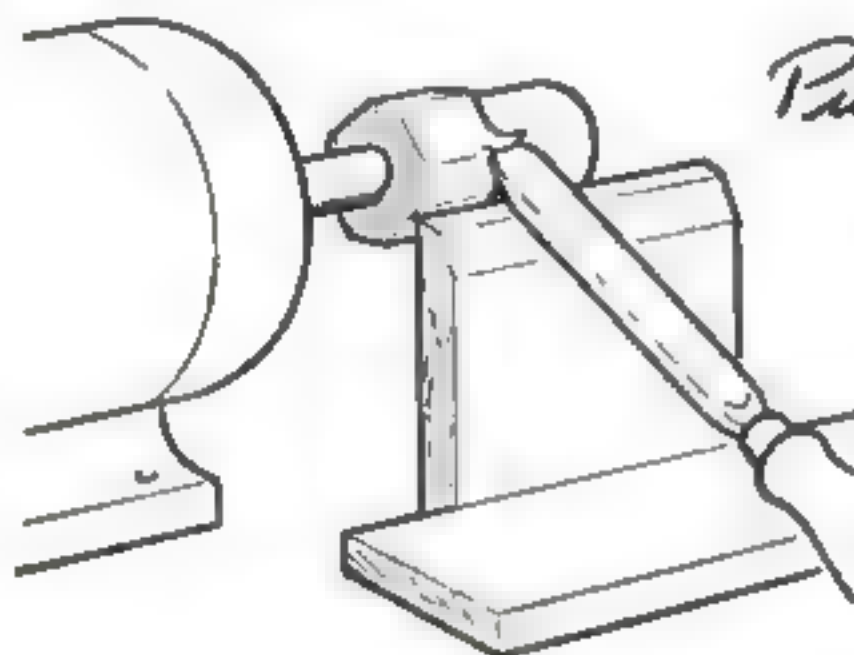
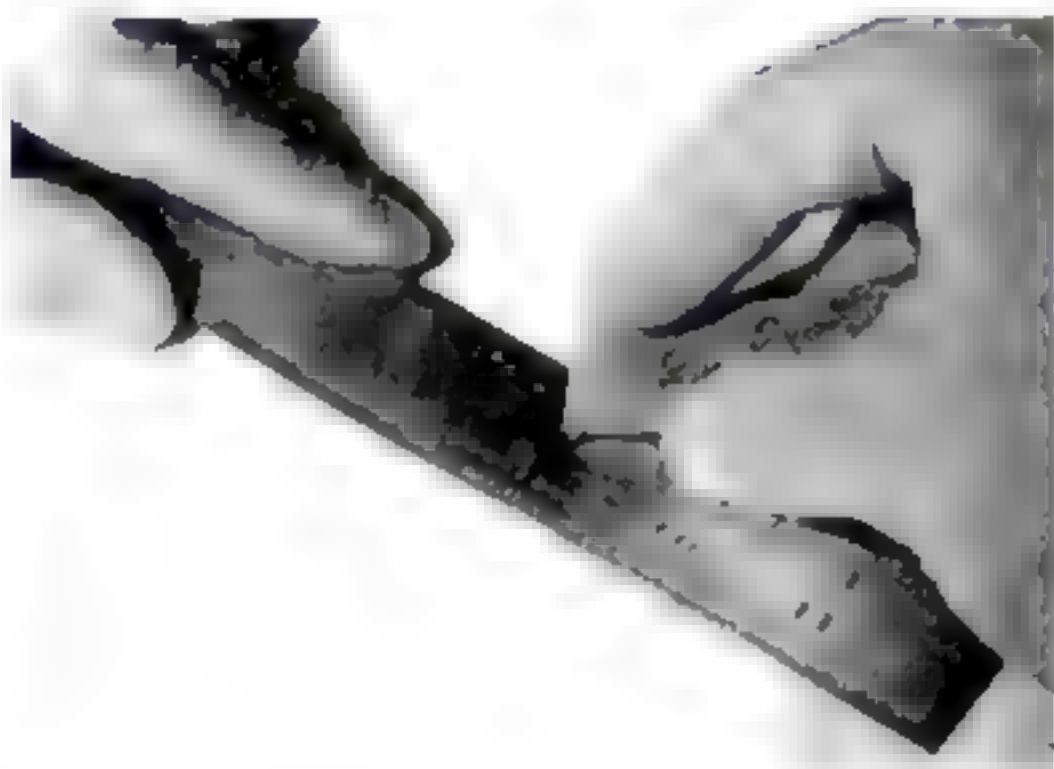
YES NO
☐ ☐

You should have one duplex outlet for every 6' to 10' of wall in living areas and every 4' of counter space in the kitchen, with a separate outlet for the refrigerator. At least one outlet in every room should be controlled by a wall switch. **END**

PS Shop Notebook

Handy Polisher

Tools can be brightened in seconds if you keep a typewriter eraser with them. When they get dark or start corroding from moisture, just rub them with the eraser. The mild abrasive in the rubber scours tools clean. Clean the eraser on sandpaper occasionally.—Phil McCafferty, Cedar Rapids, Iowa.

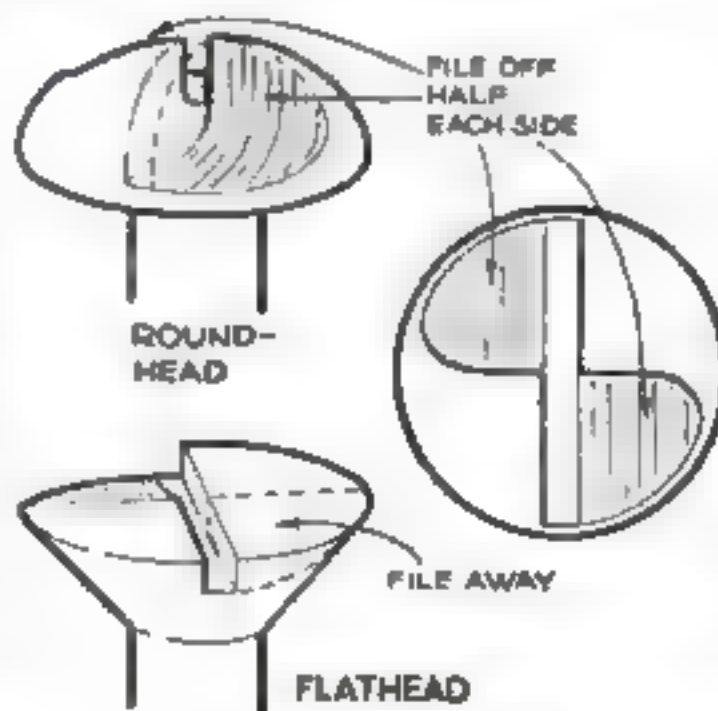


Pulleys Turned on Motor

Pulleys that will serve for years can be made from wood. Bore a block of hardwood slightly undersize and drive it on the motor shaft—right over the keyway if there is one. With the tight fit you get, no setscrew is needed. Next, rig a temporary tool rest beside the motor; turn the pulley to size.—C. Woodson, East Aurora, N. Y.

HAVE YOU TRIED THIS?

Keep thieves from stealing car accessories, yard ornaments and other outdoor objects by filing the heads of their mounting screws so that they'll only turn in. File away two quarters of the screw head, leaving only the sides of the slot that will give a screwdriver purchase for tightening. Be sure you have everything in place before you drive the screw home—you'll have to drill it out to remove it.

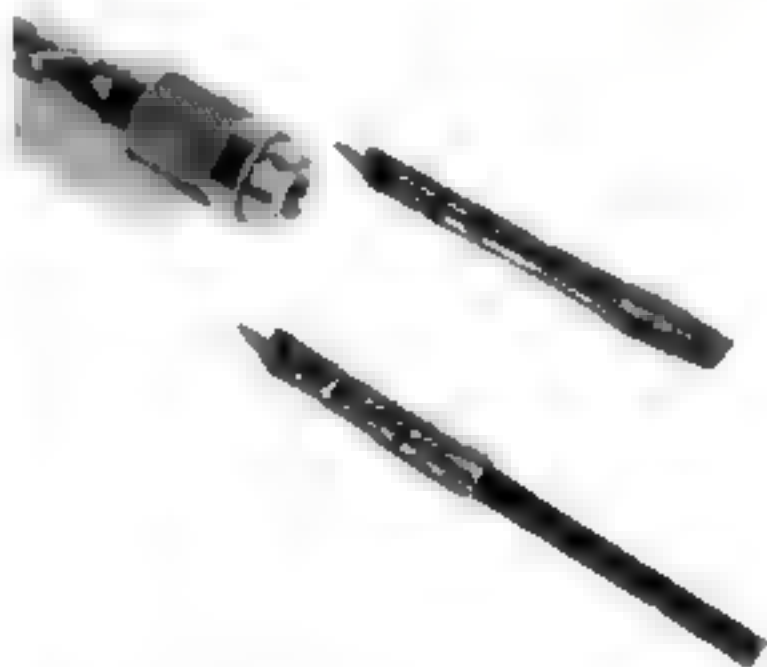


Tubing Makes Key

Need a special key for the square shaft of an antique clock, an old piano lid or just a pair of roller skates? You can make any size by forging brass tubing over the tapered square tang of a file. Use tubing large enough for the size you're making, insert the file tang to the point where the taper is large enough, and hammer the tubing around it. If the key is too small, it can be stretched by driving the taper on into the square hole. If too

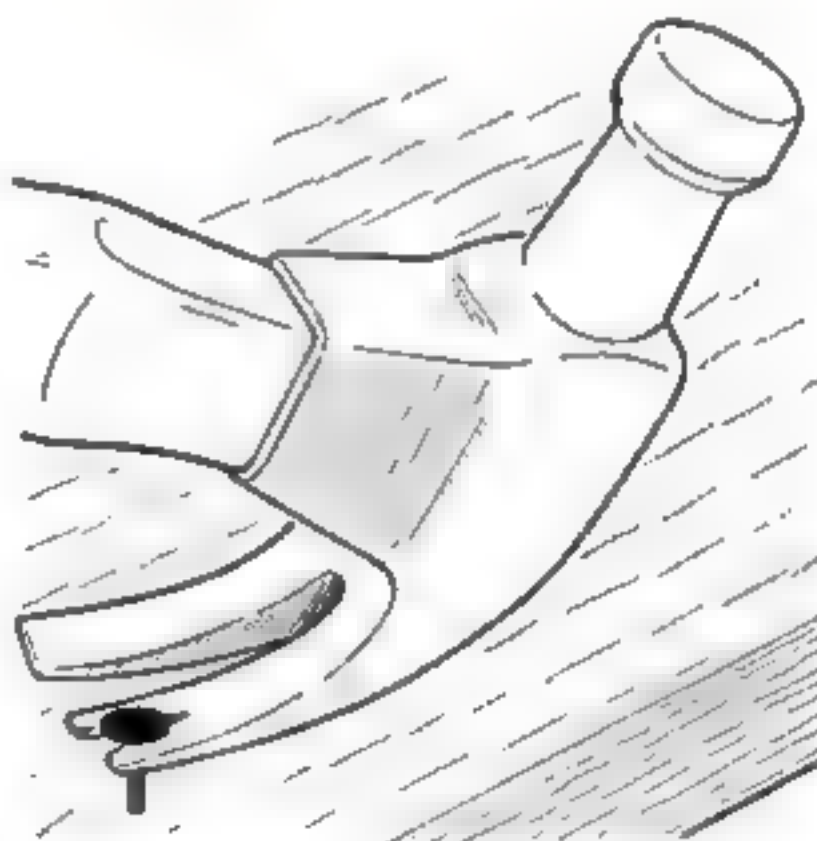


large, continued hammering will compress the brass around the taper. Pin a knob or a handle on the key.



Fast Working Hex Wrenches

You can adapt hex wrenches to utilize the speedy action of a spiral-drive screwdriver. Make several steel shanks, filing an offset end and V notch to match those on the screwdriver's regular bits. Drill holes in their ends and solder short lengths of hex wrenches (or rod) in them.—*Frank Bernstein, Maspeth, N. Y.*



Tack Puller

File a V notch in one claw of a hammer for pulling tacks and brads. It won't interfere with the use of the claw for pulling nails, and its thin edge will easily get under small fastenings.—*G. Lynch, Asheville, N. C.*

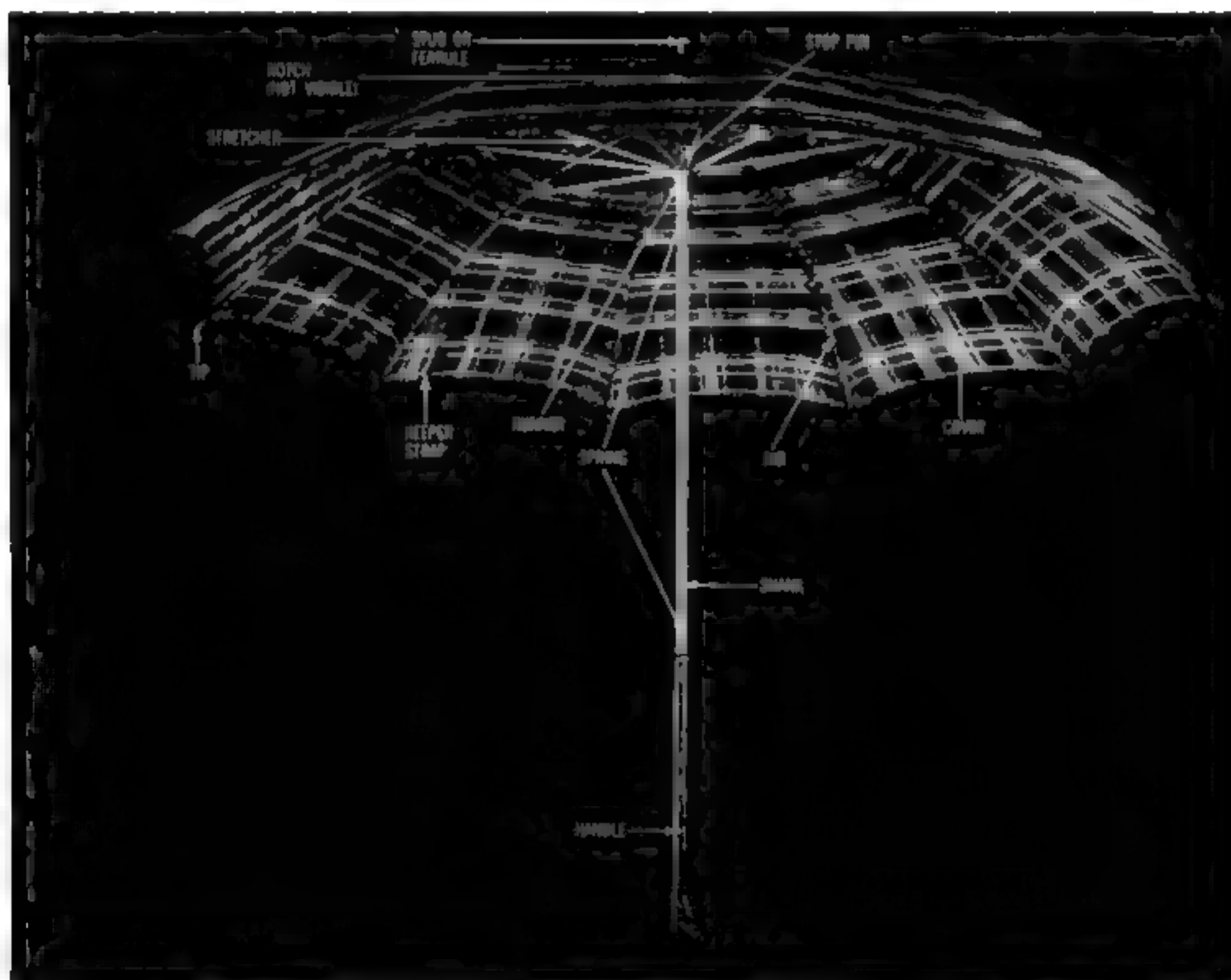
**Here's one job you should
NOT put off until a rainy day!**

How to Repair an Umbrella

APRIL showers call for a reappraisal of the cripples in the old umbrella stand. It often takes no more than the fittings from one battered veteran to put another back in service. At worst, you may have to buy a few new parts. Many umbrella-repair shops sell them, and a back-in-business umbrella is well worth the few pennies they'll cost.

Other than applying a new cover—a chore best left to the experts—umbrella mending falls into two classes: rib repair and shank-and-handle repair. You can do this work with common hand tools. Look over the pictures of renovating jobs on these four pages and you'll wonder why you've put up with a beat-up bumbershoot so long.—*Darrell Huff.*

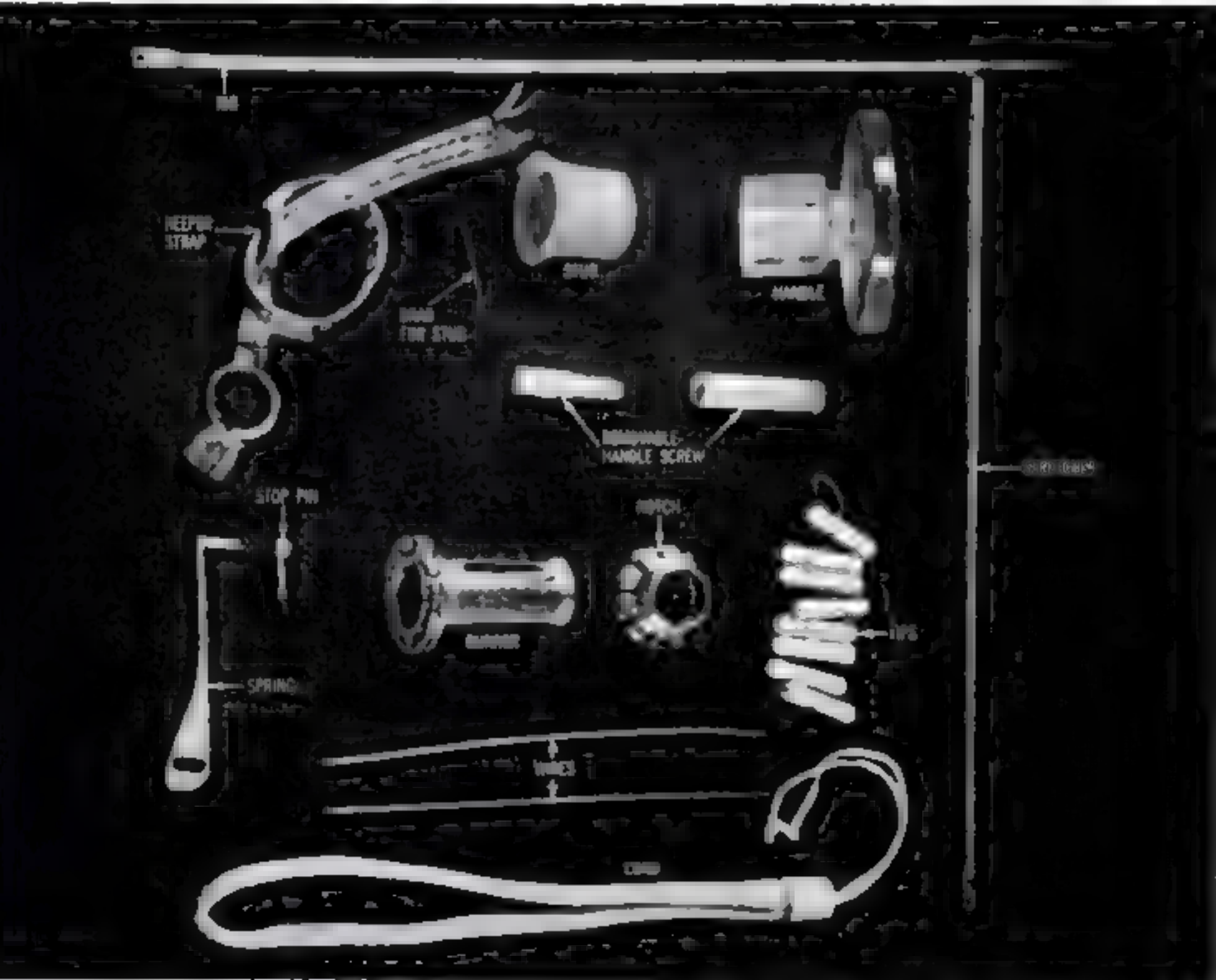
These parts make up an umbrella



COVER SHRUNKEN? To re-stretch it, open the umbrella as far as possible and back up the runner with a clamp, as shown. Keeping the cover wet, advance the clamp at intervals until the runner snaps back over the upper spring. Don't try to hurry the job—it may take hours of intermittent attention to put such a bumbershoot back in working order. Next time, be sure the umbrella is dry before you close it.



.....and these are typical replacement fittings



How to replace bent or broken ribs



1 TWO POINTS OF RIB-REPAIR WORK are demonstrated by a veteran renovator at the California Umbrella Works in San Francisco. Place the umbrella stub in a hole, for support, and work on it with the ribs half-open.

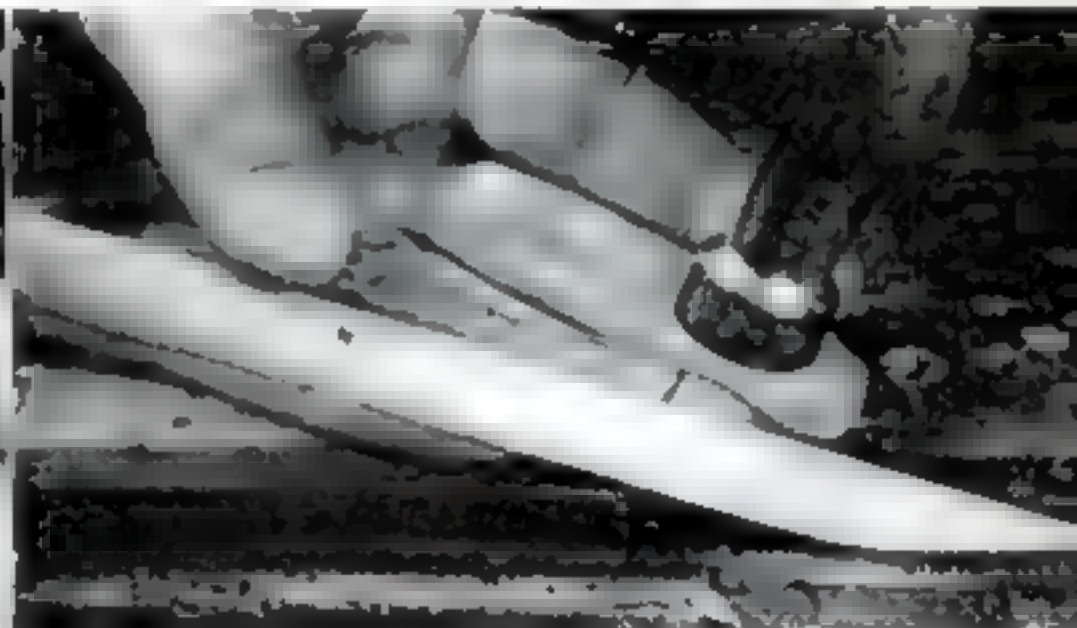


2 TO REMOVE DAMAGED RIBS, pull their tips loose and snip the loops of thread holding them to the cover. Untwist and remove the wire loops that attach the stretchers to the runner and the ribs to the umbrella-top notch.

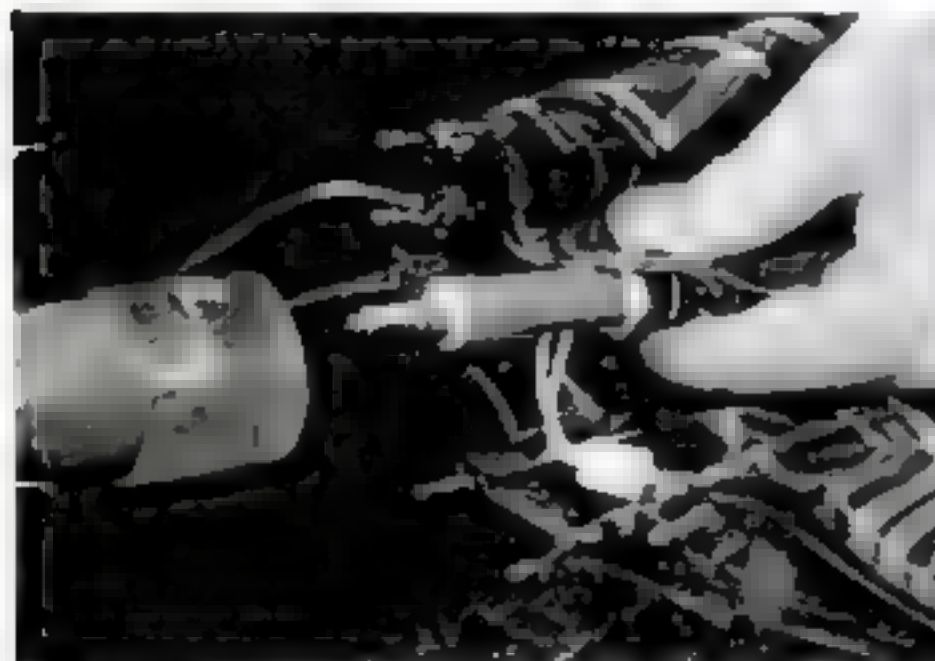
Tips on shank and handle repairs



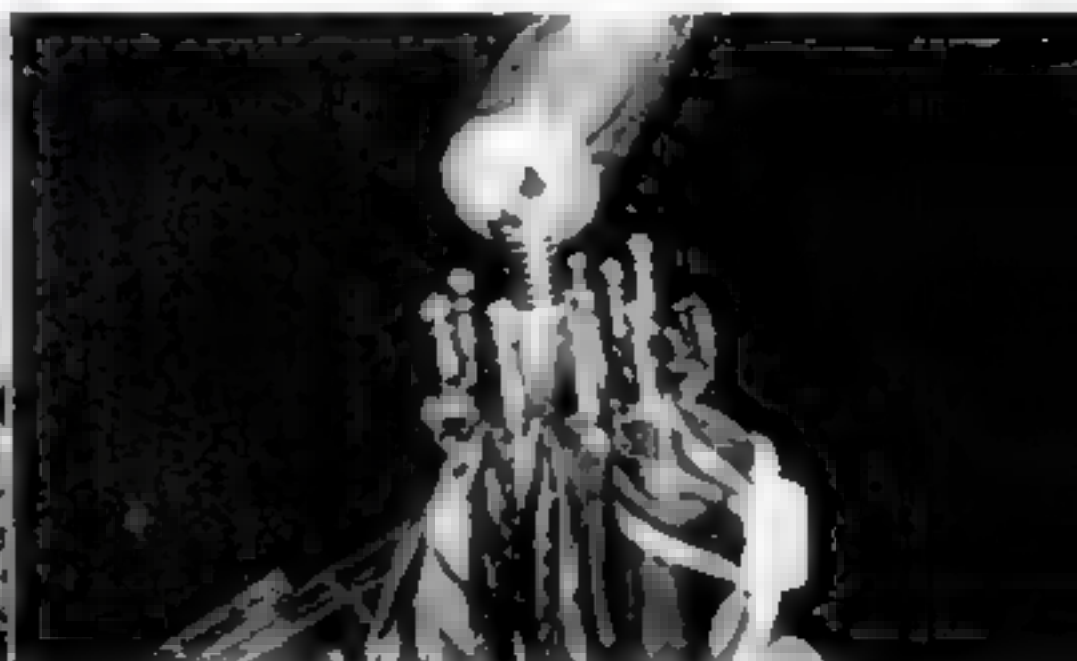
1 STOP PIN, above runner of an open umbrella, keeps rib assembly from turning inside-out when wind strikes from below. If the pin is lost or worn, you can fill the need with a large-headed nail or a roundhead wood screw.



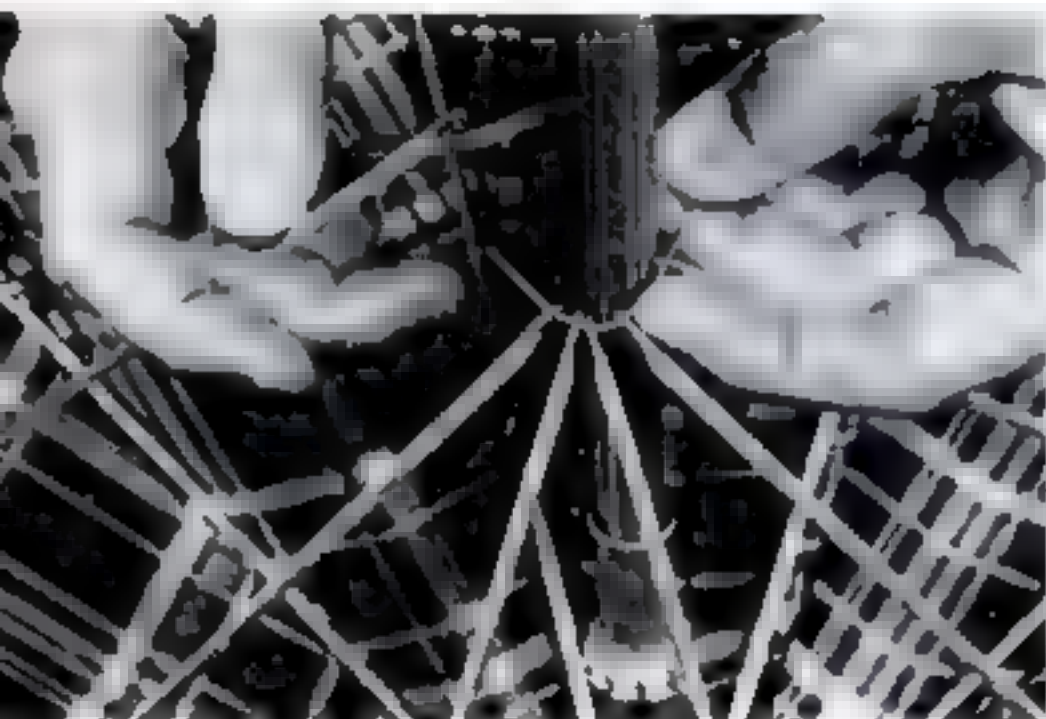
2 TO REPLACE A SPRING on a wooden shank, drive its pointed end level with slot, and facing center of the shank. Then push a common pin through the shank and spring hole at "X". Clip off the pin and file it flush.



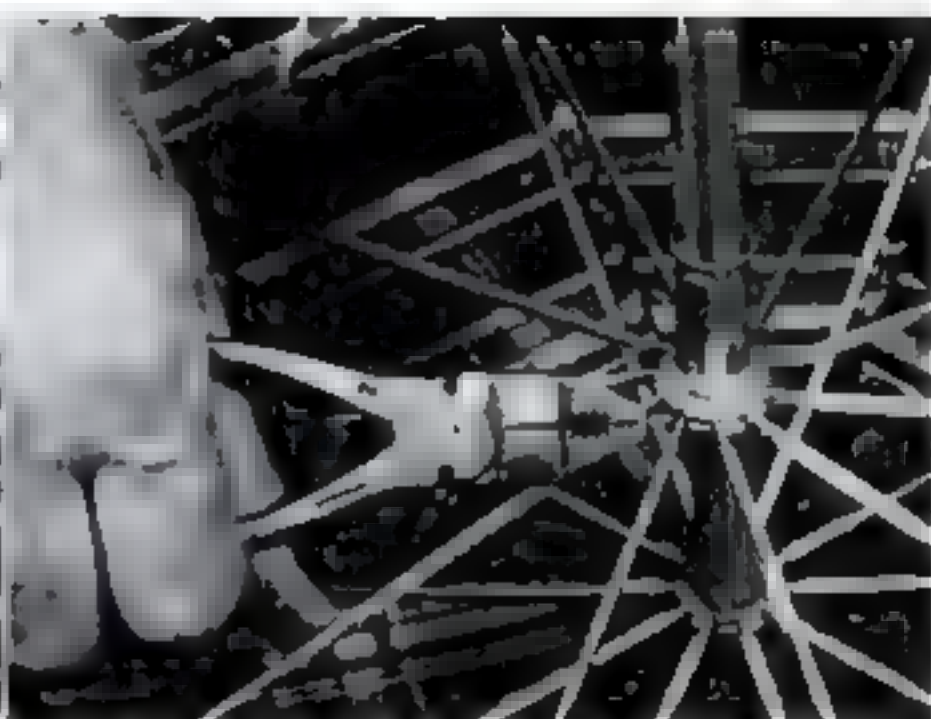
5 SUITCASE UMBRELLA can be made of a long-handled type with a removable-handle screw that you can buy at an umbrella-repair shop. First step: Saw off the handle, drill a hole in the shank, and glue in the male fitting.



6 SLEEVE SECTION of the handle screw is then cemented into hole drilled in the umbrella handle. Be sure that both this hole and the one in the shank are accurately centered. Handle may now be put on and taken off at will.



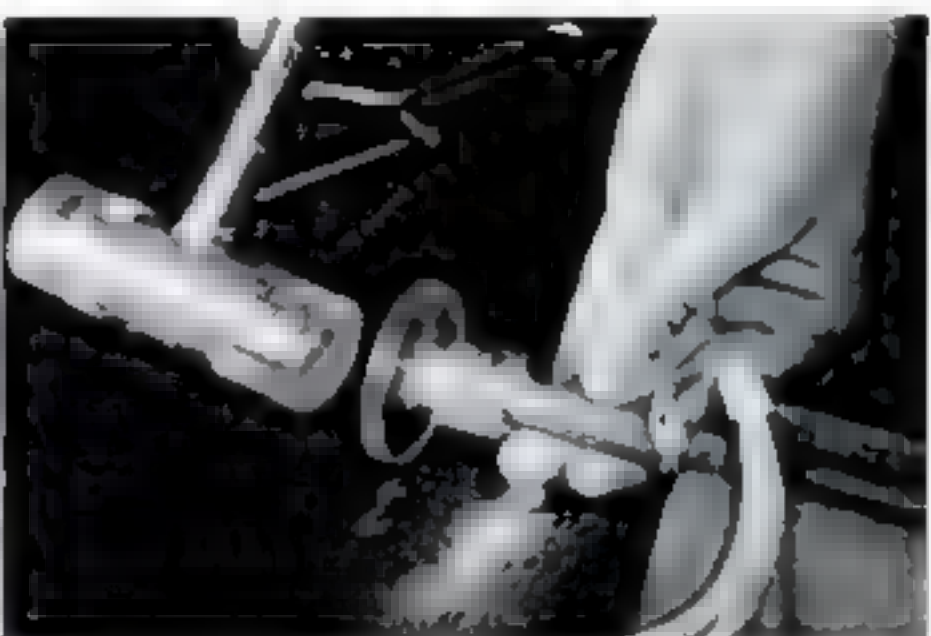
3 **KEEPING RIBS IN ORDER**, insert new ones where needed. Run a length of soft wire through the hole at the inner end of each rib and relasten it to the umbrella-top notch. Wire the stretcher holes in a similar manner.



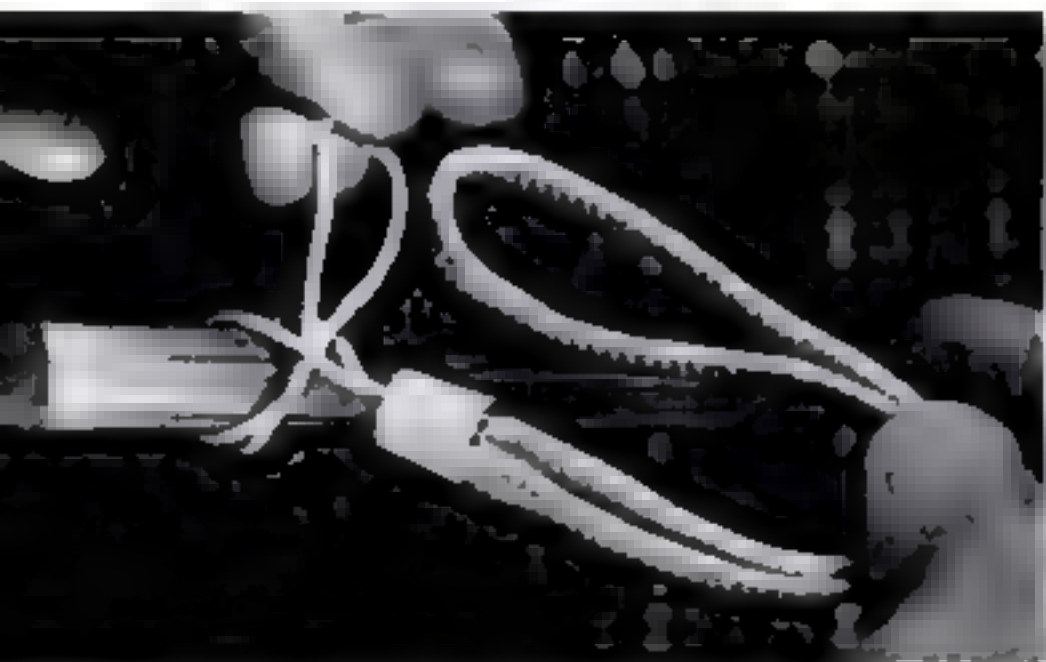
4 **FASTENING** at both notch and runner is completed by twisting wire ends together and cutting off the excess. Be sure runner slot and lower spring align. Restitch ribs to the hem of the cover with beeswax-coated thread.



3 **REMOVE OLD UMBRELLA HANDLES** by soaking them until they expand and loosen, or split carefully to avoid damaging the shank. To shorten a long-shanked umbrella for the "new look," saw through the shank, as shown.



4 **BEFORE PUTTING ON A NEW HANDLE**, shave down the shank if it is too large, or wrap the shank with thread or string if the fit is too loose. Either way, apply glue or household cement before driving the handle home.

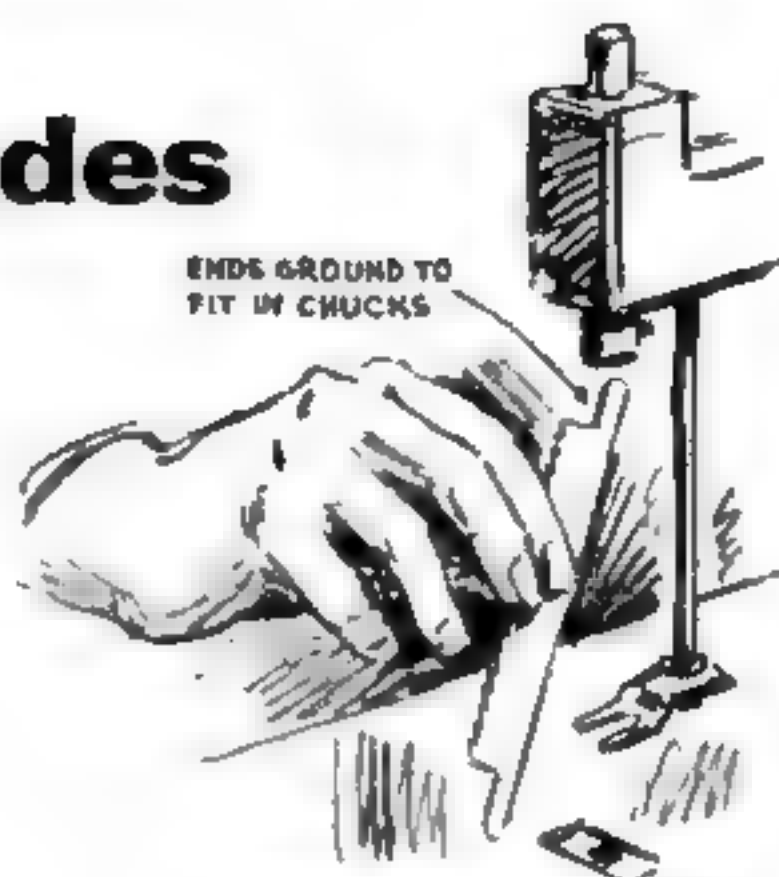


7 **REPLACING CARRYING CORD** that is lost or worn is simple. Wrap the small part of the cord around the shank and bring it back through itself. Then push the heavy cord through the small loop and pull it tight.

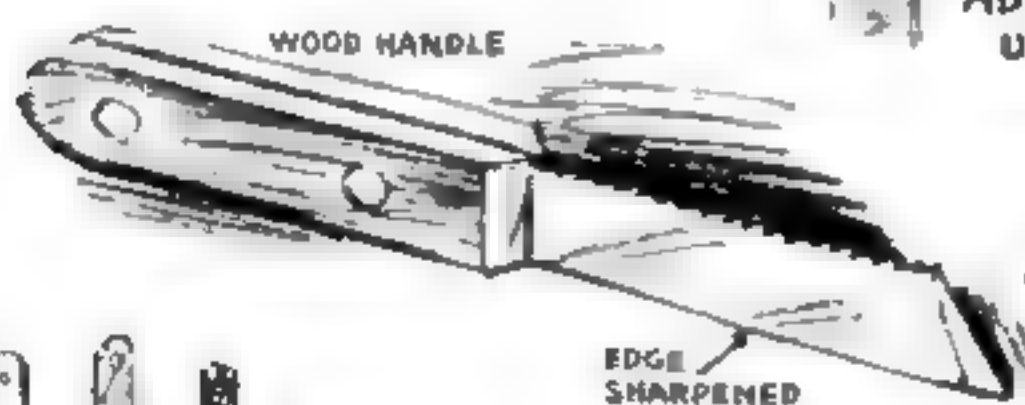
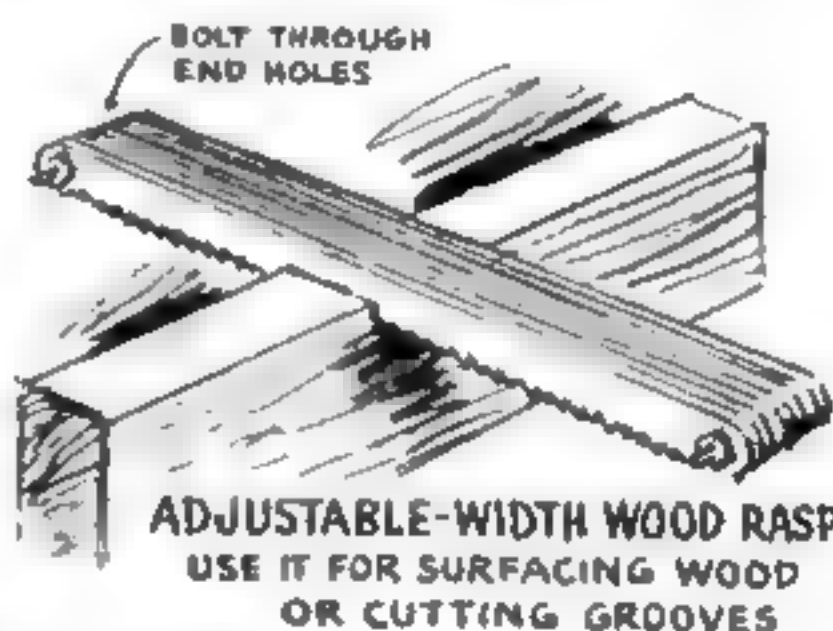
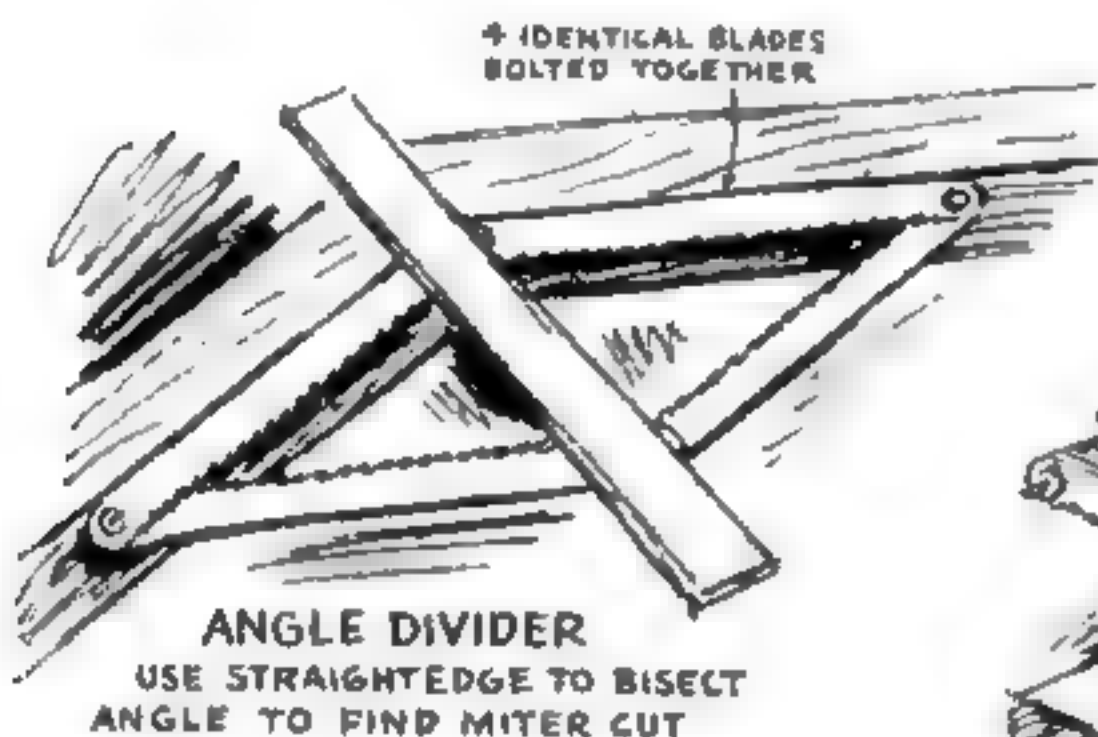


8 **UMBRELLA STUBS TAKE A BEATING.** If you put on a new one, make sure that it gets a snug fit against the fabric. Apply glue before driving it onto the top of the shank. The stub shown here is of the cane type. END

7 USES FOR Hacksaw Blades

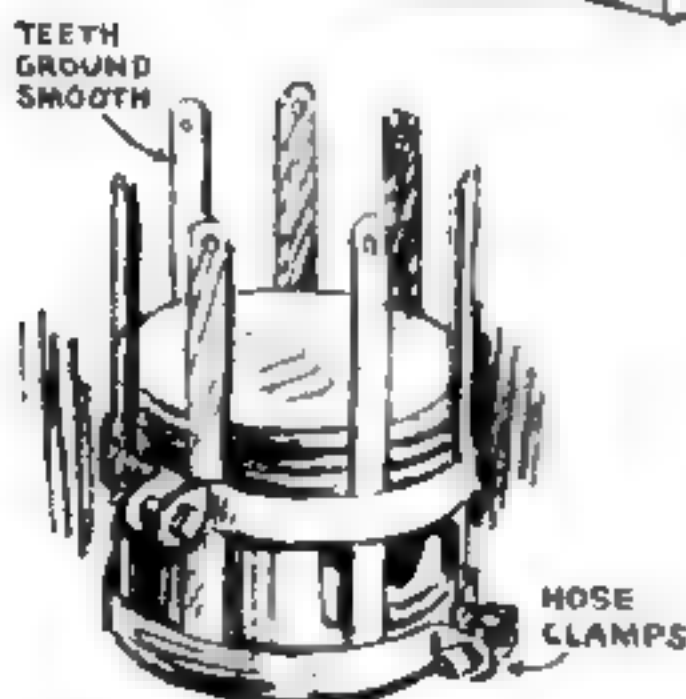


METAL-CUTTING JIGSAW BLADE USE ENDS OF BLADES WHERE TEETH ARE STILL SHARP



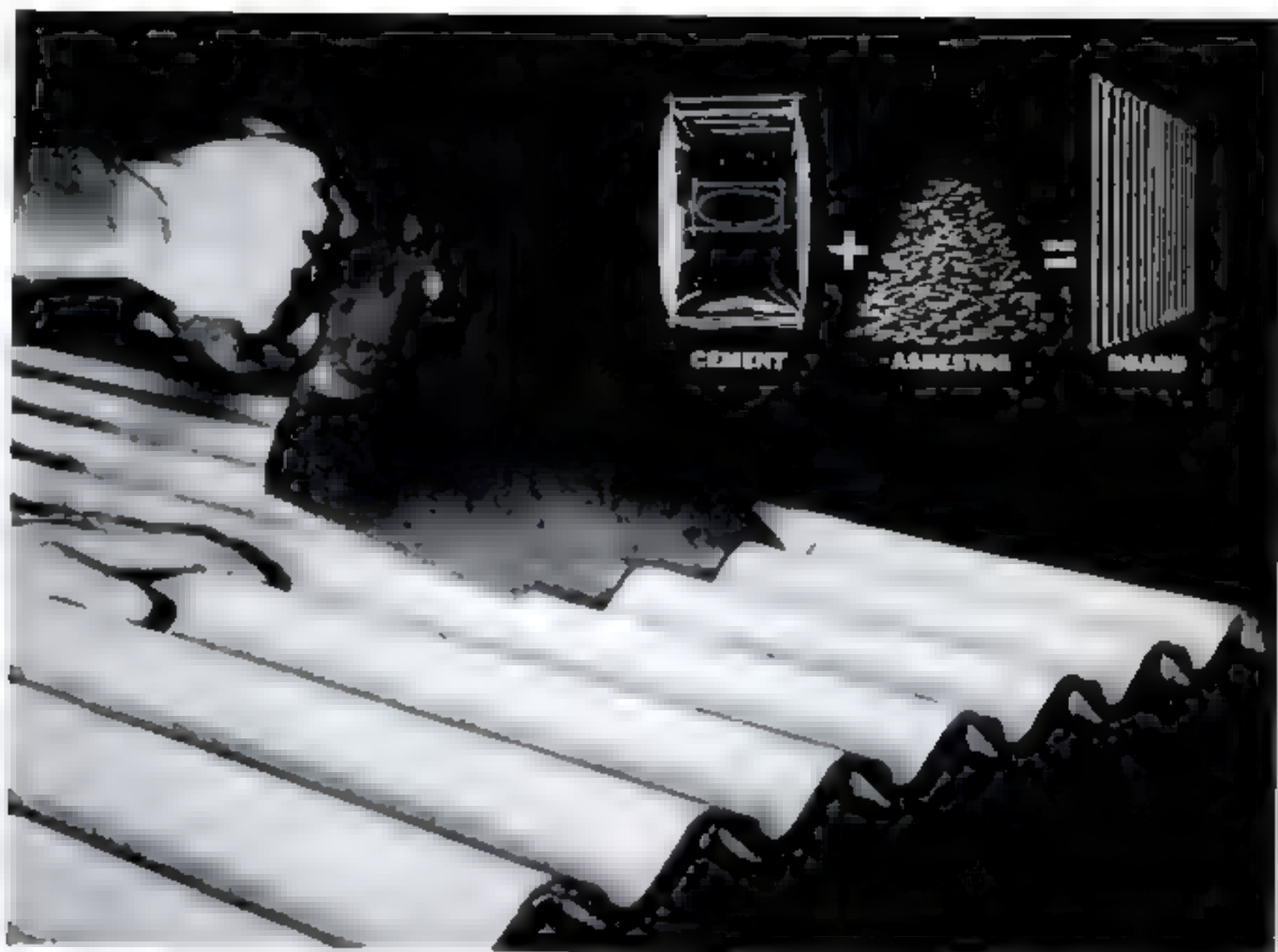
FISHING KNIFE
TOOTHED EDGE REMOVES FISH SCALES

GLUE SPREADER
TEETH DISTRIBUTE GLUE EVENLY



PISTON-RING COMPRESSOR
BLADES HOLD RINGS IN GROOVES WHILE PISTON IS PUSHED INTO CYLINDER





Here's how to use—

The Building Board That Won't Burn

By Darrell Huff

ASBESTOS and common cement are a couple of materials that almost nothing can harm.

Combine them so that the asbestos fibers reinforce the cement, form this mass into sheets under high pressure, and you have asbestos-cement board.

It's widely available now, and growing in popularity. If you haven't been using it around your house and shop, you may be missing a good bet.

Advantages. The board is inexpensively and remarkably hard-surfaced and durable.

It resists fire—ever try to burn as-

bestos or cement? Painted or unpainted, it stands up to weather.

You can get it flat or corrugated—and sometimes now in interesting ribbed and fluted decorative forms. The flat sheets come in both flexible and rigid types in thicknesses from $\frac{1}{8}$ " to $\frac{3}{4}$ ".

The weatherproof nature of the board fits it for many outdoor uses. It makes outbuildings, fences, garden borders and patio roofs that need no paint.

For a cabin wall, it can be left unpainted (its natural color is soft gray). Where color is wanted, as for siding a house, it takes paint so smoothly that it is unusually quick and cheap to paint.

Because it won't burn, asbestos board

Three of the ways you can use asbestos-cement board

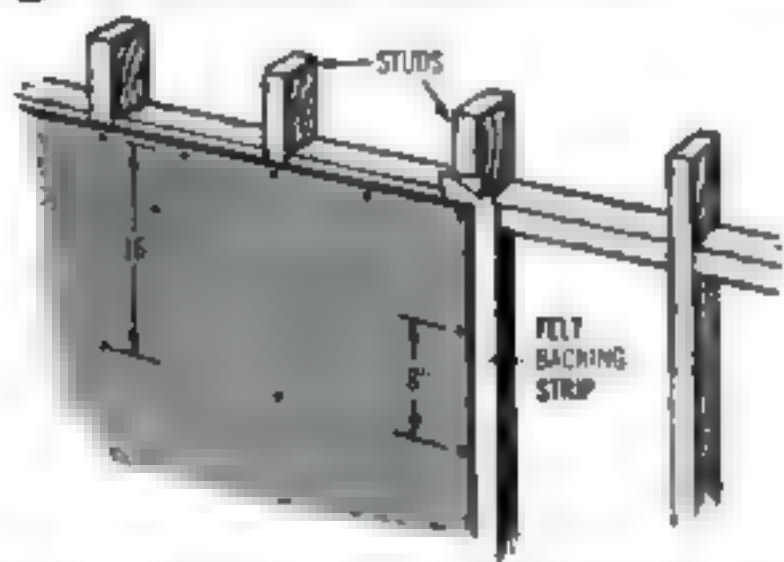


EXTERIOR WALLS

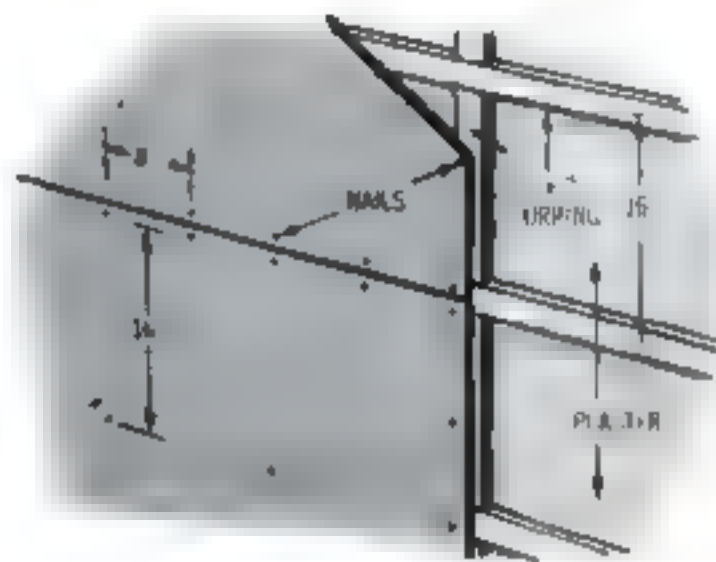
PATIO ROOF

FENCE

It goes on new walls or old



POSITION BOARDS so that joints fall over frame members. On new work, nail boards directly to studs, as above. When covering old plaster



or masonry walls, nail boards over furring strips on 16" centers. Space nails 8" apart. On new exterior walls, back the joints with felt strip.

is a splendid wall material around fireplaces, behind stoves or in the part of your shop where welding is done. This same characteristic makes it useful for backing radio cabinets where there may be a good deal of heat. It is good for lining closets, laundries and garages; and for making laundry chutes, heating ducts and firewall partitions.

Disadvantages. The board has some drawbacks, too.

The corrugated type is more difficult to cut than most other building materials. So is the flat type—but where straight cuts are needed flat board may be scored and broken in a jiffy.

It is more brittle than many building materials, so it may be broken in handling. But once the board is up this is seldom a problem.

The $\frac{1}{4}$ "-to- $\frac{3}{4}$ " corrugated boards used for roofs are much heavier than cor-

rugated aluminum—as much as five pounds to the square foot instead of about a half-pound. This means that framing has to be stouter too.

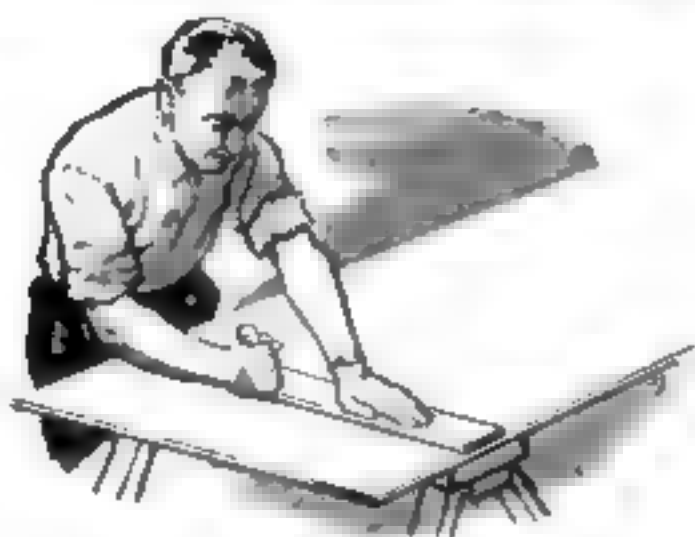
Choosing your board. In flat asbestos board, the thick and rigid sheets are mostly for industrial use. For light construction and jobs around the house you'll find the flexible varieties more useful and easier to buy. They come in $\frac{1}{8}$ ", $\frac{1}{4}$ " and $\frac{3}{8}$ " thicknesses, under such descriptive trade names as Flexboard and Pliaboard.

Standard size is 4' by 8'. Sheets 4' by 4' and up to 4' by 12' are sometimes offered.

The corrugated type is usually 42" wide, with 10 corrugations to the sheet. Lengths may be anywhere from 2' to 12'. There's also a kind only 8" long. It is used to border flower beds and sidewalks and is called Garden Trim.

The fluted or ribbed decorative panels,

Scoring and breaking brings a flat board to size



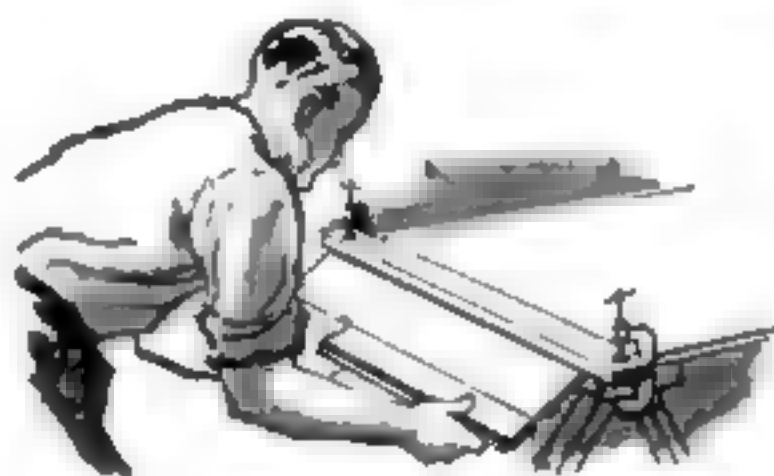
MEASURE FOR CUT (on the smooth side), then place a straightedge or two-by-four along cutting line. Score deeply with knife or ice pick.



SLIDE THE PANEL DOWN so that the score overhangs the saw horse or work table. Line up the straightedge carefully with the scored line.

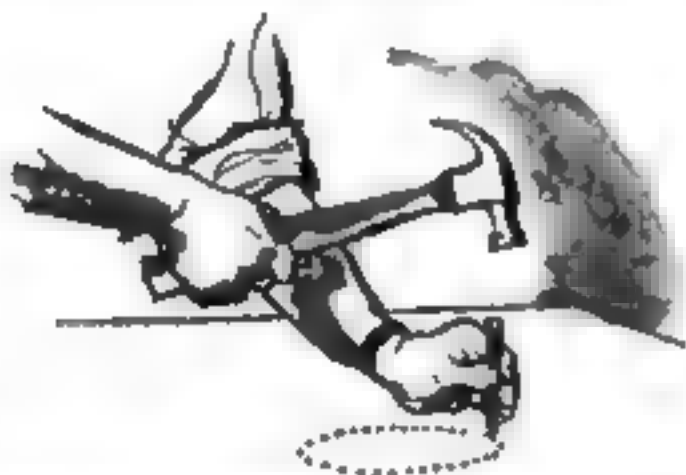


HOLD OR CLAMP the straightedge in position and press down sharply on the overhanging end. It will snap clean right at the score line.



WHEN TRIMMING WIDE PANELS, hold a piece of two-by-four against the overhanging part to distribute the pressure when breaking it off.

You can punch out holes, or saw them by hand

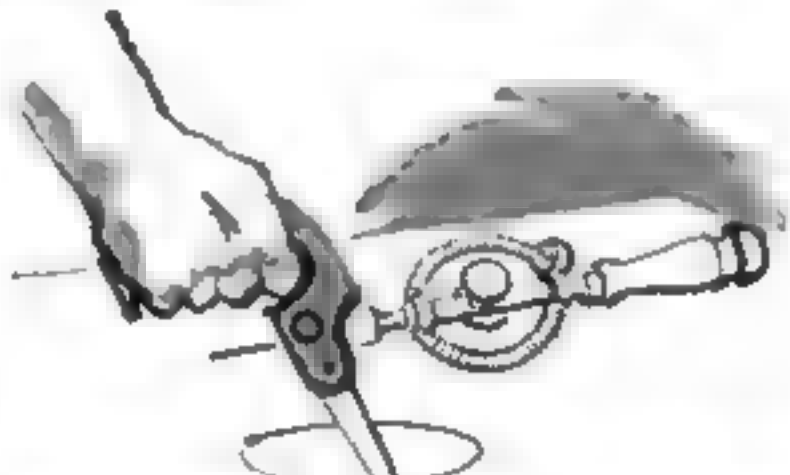


FOR SMALL OPENINGS, punch a series of closely spaced holes and drive the piece out with a hammer. Smooth the edges with a coarse file.

4' by 8's that are $\frac{1}{2}$ " thick, make interesting walls—inside and out.

How to cut it. With flat panels, scoring and breaking is quicker than cutting. Score the panel deeply with an ice pick, awl, file, linoleum knife or carbide-tipped scoring tool. Then snap off the extra portion. Smooth the edges with rasp, file or sandpaper.

Cut curves with a keyhole or coping saw, just as you would in plywood, first




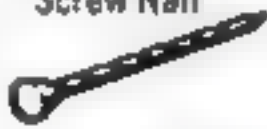


LARGE OPENINGS are easily cut with a keyhole saw. Draw the shape of the opening you want, and drill a hole for starting the saw.

drilling a hole if it is a cutout. There's a special trick for making smaller openings: Punch a series of holes close together, then knock out the piece with a hammer. You can smooth the edges with a coarse file.

Asbestos panels, including corrugated, ribbed and fluted types, can be cut with an ordinary handsaw. A 10-point saw is best; wet it with water for faster cutting. For power cutting, use a rein-

Use the right nails for each cement-board job

NAIL	HEAD	1/8" BOARD	3/16" BOARD	1/4" BOARD	INTERIOR WALLS	EXTERIOR WALLS	CEILINGS
Common Wire 	Flat	1 1/4"-14 Ga. (3 penny)	1 1/2"-12 1/2 Ga. (4 penny)	2 1/2"-10 1/4 Ga. (8 penny)	Yes	Not Recom.	Yes
Galvanized Steel Roofing 	Flat	1 1/4"-10 Ga. 1"-12 Ga.	1 1/4"-10 Ga. 1"-12 Ga.	1 1/4"-10 Ga. 1"-12 Ga.	Yes	Yes	Yes
Galvanized Steel Shingle 	Flat	1 1/2"-12 Ga.	1 1/2"-12 Ga.	1 1/2"-12 Ga.	Yes	Yes	Yes
Hard-Steel Noncorroding Screw Nail 	Casing	1"-14 Ga.	1 1/2"-14 Ga.	1 1/2"-14 Ga.	Yes	Yes	Yes



PRE-DRILL FOR LARGER-SIZE NAILS, and they'll go in without damaging the asbestos board.

forced cutoff wheel (well guarded) or a carbide-tipped blade.

When a hole is needed, use a metal drill rather than one intended for wood. This stuff is pretty hard.

How to nail it. Apply asbestos-cement board according to the routines shown in the sketches. Pre-drilling is needed only for larger-size nails. Use a nail set to drive nails home in non-flat board.

While you can use either battened or V joints anywhere, battened joints are usually the better choice for exteriors. V joints are attractive for interior walls.

Battens should be about 3" wide—either strips of asbestos board or standard 1"-by-3" wood battens.

Make the V joints by beveling the edges of the board before you nail it up. Bevel it about 1/4" with a rasp or sandpaper.

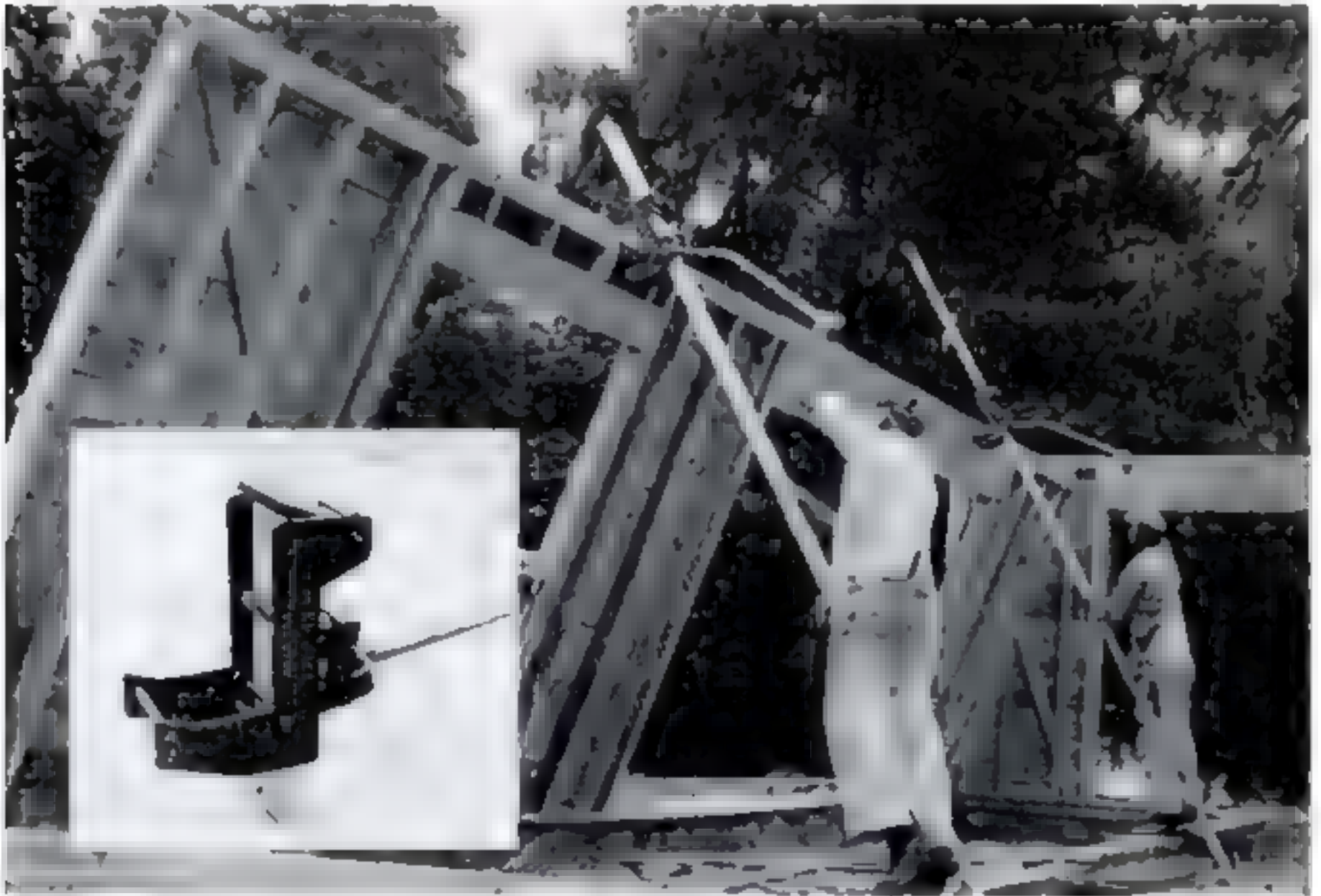
Nails should usually not be thicker than 11- or 12-gauge and should have needle points. They should be long enough to go about 1" into the wood. Use rustproof nails for exteriors and damp interiors; hot-dipped galvanized asbestos-shingle nails for general use.

How to paint it. One helpful thing about asbestos-cement board is that you can put it up now and paint it year-after-next—or never. You can clean it with a hose or scrub it with soap and water and a fiber brush. Or use household cleansers: Old Dutch, Oakite, Bab-O.

For dirt stains, try a strong solution of sodium hypochlorite or a two-percent solution of oxalic acid. Rinse thoroughly with clear water.

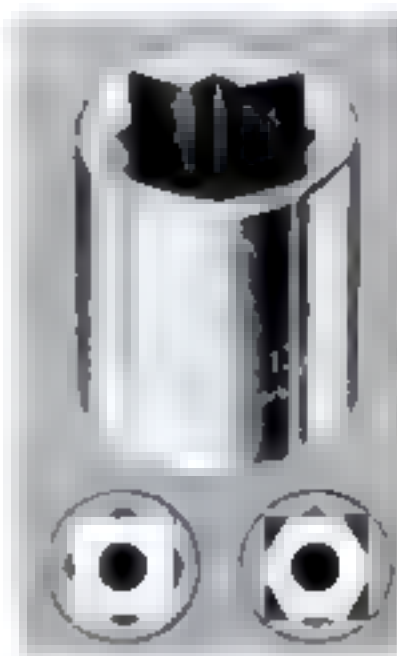
When you paint asbestos board it's to cover discolorations or simply to get color. Be sure the surface is clean and dry before you start painting. **END**

New Tools



1. Versatile Jack Is High Lifter. Climbing a length of two-by-four, this jack will raise a 1,000-lb. weight as high as the beam is long. Using two or more—alone if you haven't got a helper—you can up-end a pre-assembled wall and hold it steady while you nail it in place.

The jack is threaded between two gripping members onto the lower end of any dressed two-by-four, and its foot is placed under the load. It then "walks" the load up the beam as you pump its 30" lever.



2. Dual Socket. Eight corners, spaced at 45°, enable this new socket to fit both hex and square nuts of the same size.

You can get a set of six in sizes from $\frac{1}{2}$ " to $\frac{1}{4}$ ", or a full set of 11 from $\frac{1}{8}$ " to 1" with a $\frac{1}{2}$ "-drive ratchet wrench.

3. Pocket Saw Has Flexible Blade. With a finger in each end ring of this new French-made saw, you can cut heavy wood, plastics or nonferrous metals, or you can string it on a bowed stick for use with one hand. Between jobs it tucks in a pocket like a coiled key chain.

It has an 18" wire-like steel blade with nonclogging double-spiral teeth.

More information about these new tools can be obtained from: 1. Home Service Co., 1788 Ninth Ave., S.W., Seattle 6; 2. Wright Tool & Forge Co., 42 E. State St., Barberton, Ohio; 3. Ferro, 91 Broadway, Jersey City.

New for the Handyman

.....



1. Accordion-Fold Insulation. A 750'-strip of this aluminum laminate (1,000 sq. ft.) comes in a flat 3' carton weighing 55 lb. You cut it to length, unfold and staple it between studs. Air spaces separate its multiple reflective surfaces. Smaller boxes can also be purchased.



3. Do-It-Yourself Iron Railing. Ring joints, with bolt slots on three sides, are the key to assembling this railing. They come both as spacers and as end pieces on the vertical members. The slots allow adjustment to step pitch. Kits for various-length sections are available.

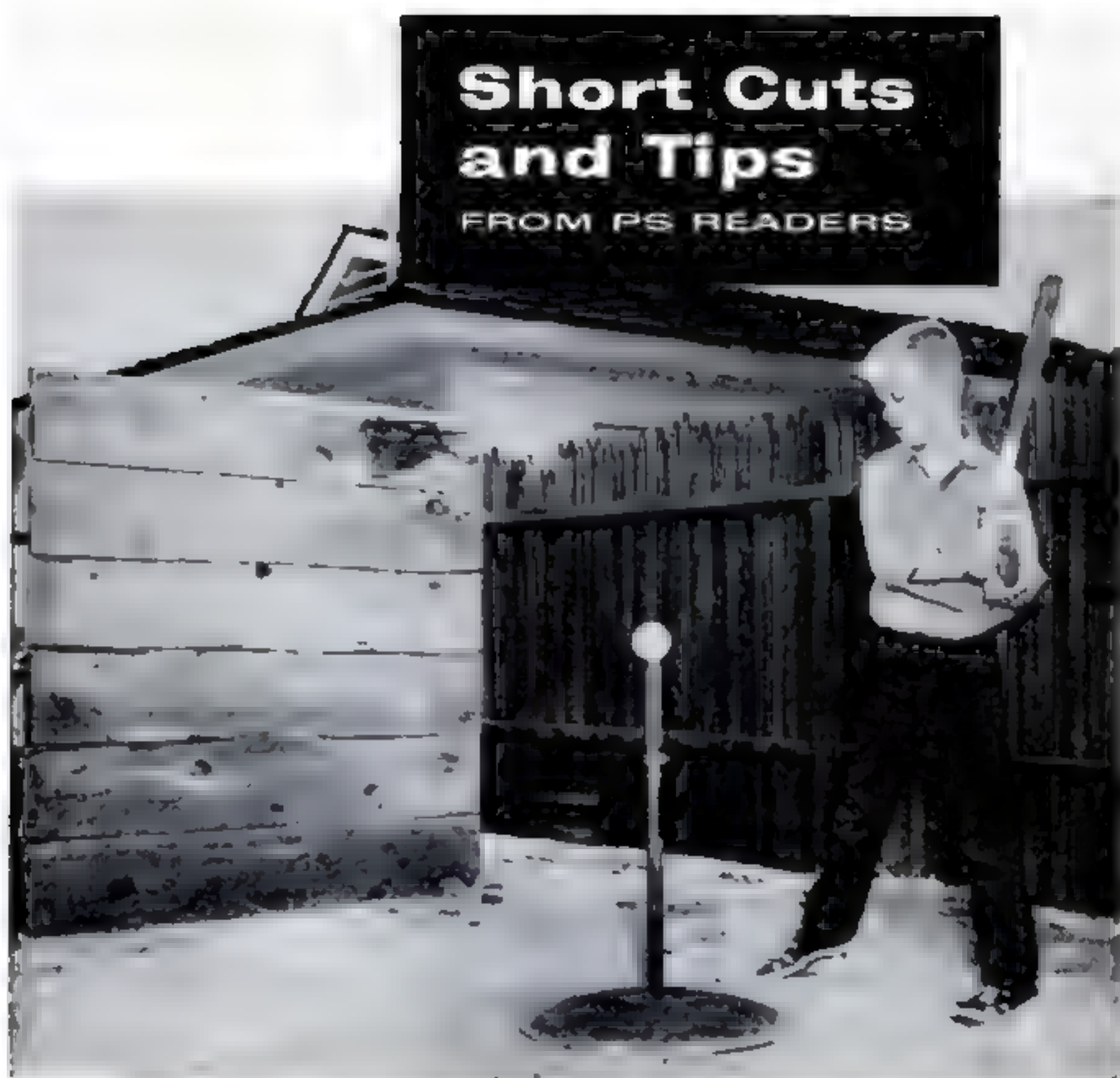
2. Platform Tops Ladder. A 3'-by-3' lightweight magnesium platform caps the end of any standard single or extension ladder to provide a firm working area. You can fit a hoist attachment to it to lift tools and materials to working height. The unit folds flat for transporting.



4. Sliding Door Is Ready to Hang. All you need do to install this door unit is put it into the wall opening, hang it to the rough header with two bolts, and nail the frame in. The parts—track, two sliding sections, finish header and frame—come completely assembled.



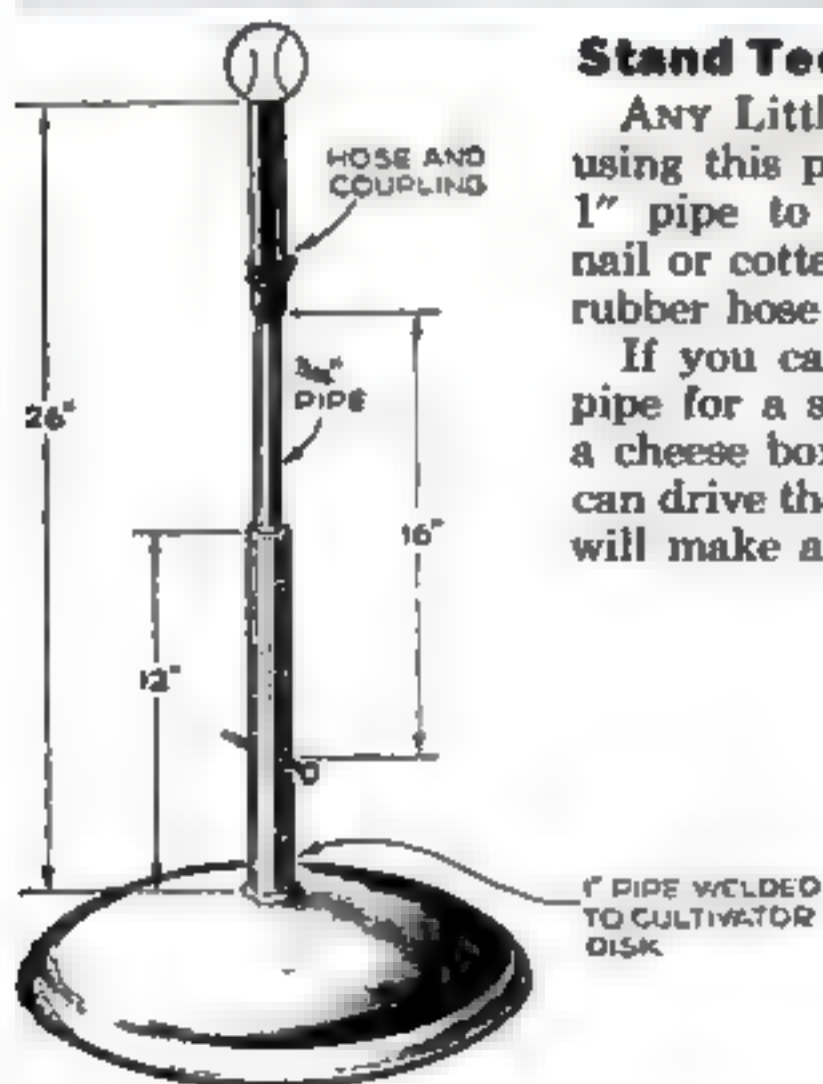
More information about these products can be obtained from: 1. Intra Insulation, Inc., 375 Broadway, NYC; 2. Munson Co., Fenton, Mich.; 3. Hi-Compression Products Co., Washington, Iowa; 4. Stanley Works, New Britain, Conn.



Stand Tees Up Ball for Batting Practice

ANY Little Leaguer can improve his batting average by using this practice setup. A length of $\frac{3}{4}$ " pipe slides in a 1" pipe to give tee-height adjustment. Drill both for a nail or cotter-pin stop. Top the tee by attaching a piece of rubber hose to the smaller pipe with a hose coupling.

If you can get an old cultivator disk, weld it to the 1" pipe for a stand, or sink the pipe in concrete poured into a cheese box. If there is no reason to move the setup, you can drive the pipe a foot into the ground. Any rough lumber will make a backstop.—Hi Sibley, Nuevo, Calif.



▶▶▶ WHEN the treads on my basement stairs became a hazard because they were worn and slippery, I covered them with $\frac{1}{4}$ " hardboard laid down screen-side up for nonslip traction. I cut the hardboard to fit flush with the front of the treads and lightly beveled the edges of each strip with a file and sandblock before nailing it down.—J. L. Rummel, Boston.

Short Cuts and Tips

Back-Yard Gym Grows with Child

AS THE child grows, so does this back-yard gym. Four holes drilled a few inches apart through each upright post let you pull out the end dowels and raise the cross ladder as the youngster increases in height.

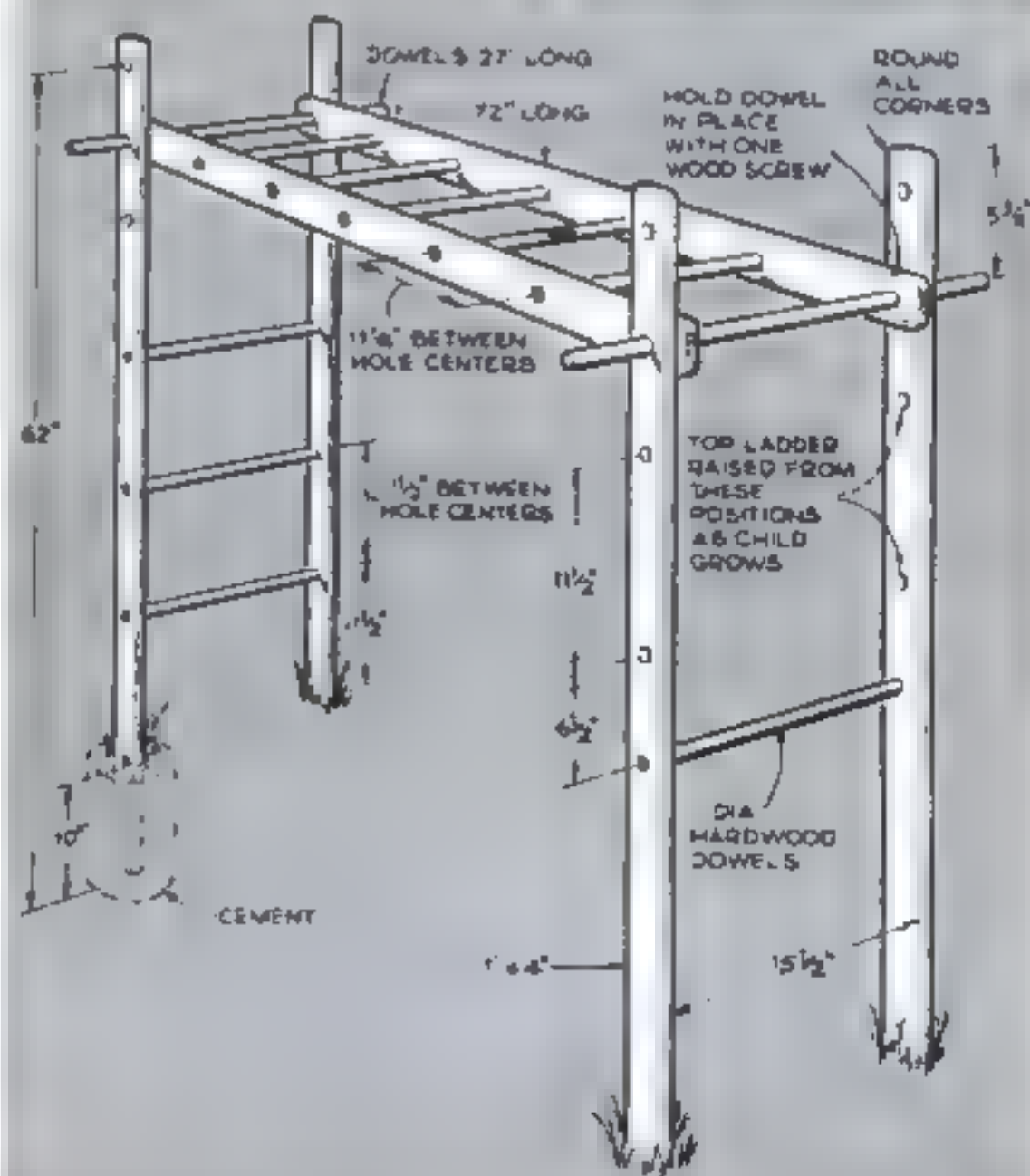
When the crosspiece is raised to the highest level, new dowels are put in the lower holes so that the child can climb to the top easily.

Build the three sections of one-by-fours and 1" hardwood dowels or, for a setup sturdy enough for a teenager, substitute two-by-fours and 1½" dowels. Set the posts in concrete and give the gym two coats of outdoor paint.—Phil McCafferty, Stanwood, Iowa.



Dowels Anchor Hinge Screws

WHEN a hinge must be fastened to a plywood edge, drill ¼" holes through the panel in the path of the screws and glue dowels into them to give the screws extra holding power.—C. C. Cooley, New Buffalo, Mich.





More road horsepower—You get all the engine power you paid for when you replace old plugs with 5-rib Champions! Independent

ent tests proved new Champions give cars of all makes an *immediate* boost in the real power actually delivered at rear wheels.

Most cars gained 6% to 31%—for better hill climb and safer passing. No wonder 9 out of 10 racing drivers insist on Champions!

How Champion spark plugs can make your car 4 ways newer

If you haven't changed your plugs in about 10,000 miles, read why Champions will make a big difference in your car's performance



2 Quicker starts—You'll get quicker starts, too . . . save wear and tear on your battery. Tests with major makes of cars showed new 5-rib Champions cut starting time as much as 71%—with an average of 39%!

3 Less engine wear—You avoid costly repairs. Misfiring plugs (left) dilute your oil with raw gasoline. New full-firing Champions (right) protect the oil. *When changing oil—check your spark plugs!*

4 Lower cost per mile—You get top power and gas economy for life of the plug. Photo shows that Champion's great new Powerfire electrode stands up better than ordinary types. *Insist on Champions!*

CHAMPION

Champion Spark Plugs Division

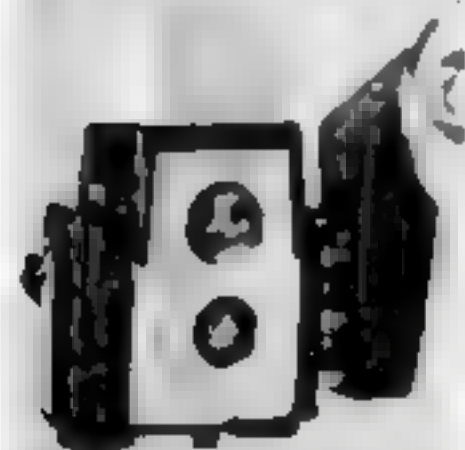
From Kodak—a wonderful



Here are 8 exciting new Kodak Cameras and photo aids that can make your picture-taking easier — more satisfying — than ever! They're made by Kodak — so you know they're good! See them all soon at your photo dealer's.

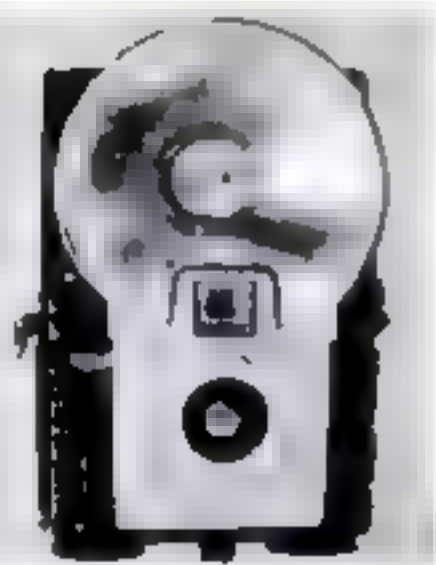
NEW BROWNIE STAR CAMERAS *take color slides, too!* First Brownie Cameras ever designed to take gorgeous *color slides* (use "Daylight Type" Ektachrome Film in bright sunlight, "Type F" with flash)...as well as lifelike color and black-and-white

snapshots. Only setting is for the kind of film you're using (color or black-and-white). Then aim and shoot! Two Brownie models to choose from:



Brownie Starflex Camera—Hooded viewfinder shows your picture big *before* you shoot. Camera only, \$9.95. Flashholder, \$3.50.

Brownie Starflash Camera—Eye-level finder makes it easy to aim each shot just right. Built-in flashholder for M2 bulbs. Only \$8.50.



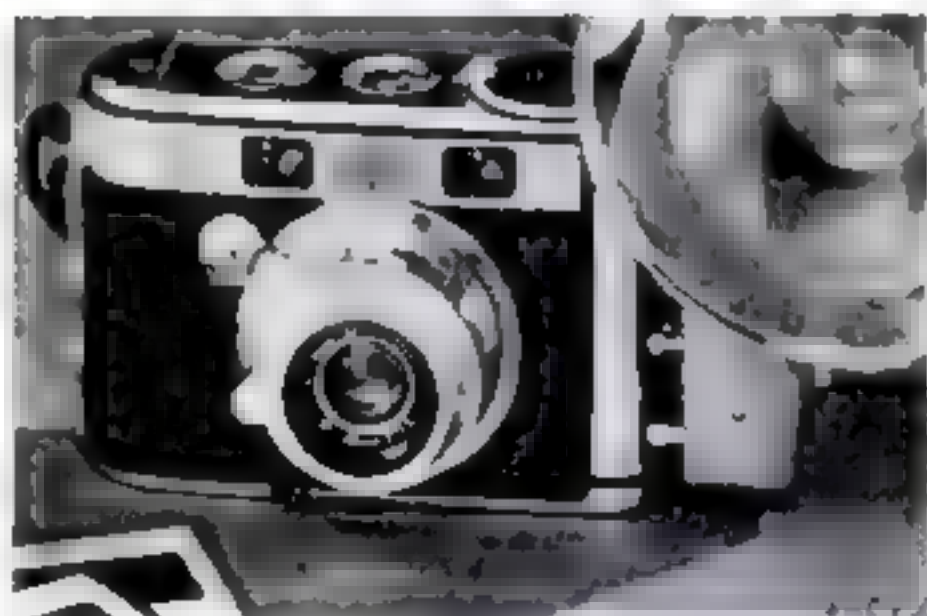
NEW KODAK ROTARY FLASHHOLDER *lets you take 6 flash shots without re-loading!* Accepts six M2 bulbs at a single loading, changes bulbs instantly by rotating the turret, ejects all spent bulbs simultaneously—and can be reloaded in split seconds! Equipped for B-C battery power. New, simplified flash calculator. Available in two

models to fit most shutter-synchronized cameras. Complete with two carrier discs, each of which accepts 6 flashbulbs per



loading. Only \$9.95 or \$11.95, depending upon the model required for your camera. (Batteries extra.)

NEW KODAK SIGNET 40 CAMERA—*gets color slides with remarkable ease.* Exclusive dual-reflector flash system and a wide range of 8 shutter speeds take *full* advantage of today's fast films, new midget

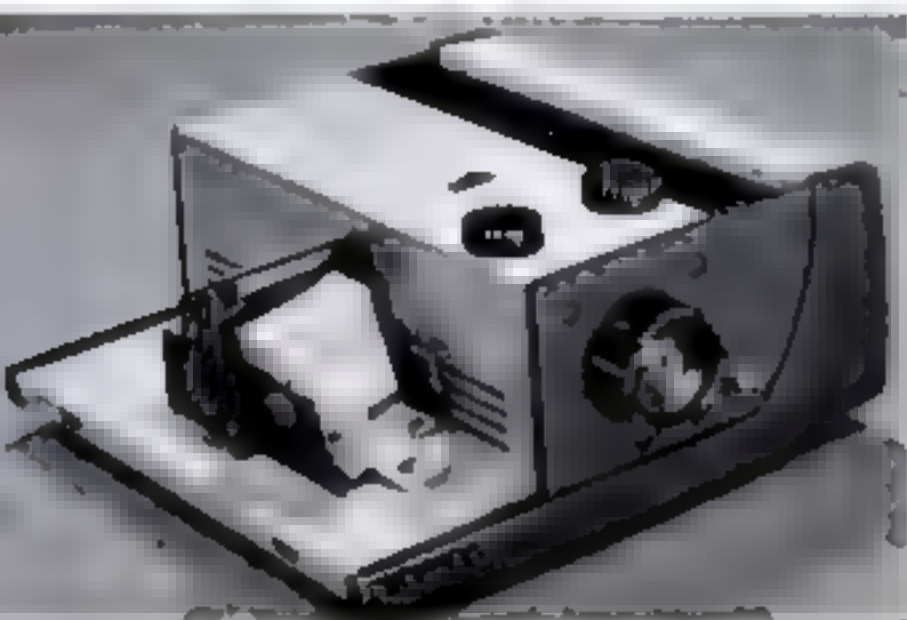


Prices are list, include Federal Tax where applicable, and are subject to change without notice

new world of picture-taking!

Flashbulbs. Ask your Kodak dealer to show you how easy it is to sight, focus, shoot, and advance the film in a Signet 40—with *all controls* at your finger tips! Superb Ektanon *f*/3.5 Lens . . . 1/5 to 1/400 Synchro Shutter . . . combined rangefinder-viewfinder. Kodak Signet 40 Camera complete with flashholder, dual reflectors, only \$69 . . . or as little as \$7 down.

NEW KODAK 300 PROJECTOR is ultra portable—yet shows your color slides *bigger!* You can carry this handsome, compact new projector like a portable radio—show any popular-size color slide in it. Sharp 4-inch, *f*/3.5 lens, plus a superb new lamp-condenser system, gives your slides brilliant big-screen projection even in a



small room. Handy finger-tip controls . . . fast, smooth slide changing. Complete in carrying case. Projector with Readymatic Changer, \$59.50 . . . \$5.95 down. With magazine changer, \$69.50 . . . \$6.95 down.

NEW KODAK MEDALLION 8 MOVIE CAMERA, *f*/1.9 is the easiest-to-use movie camera Kodak ever built! Small enough to slip in a jacket pocket. Takes only 3 seconds to load with a magazine of film—lets you switch from indoor to outdoor

color film any time. You just set the exposure dial to match the light condition . . . aim and shoot. Pre-focused lens accepts low-cost converters for wide-angle or telephoto views. Choice of speeds includes slow-motion and single frame. With *f*/1.9 lens, only \$99.50 . . . or as little as \$10 down.



Kodak Medallion 8 Movie Camera, Turret *f*/1.9, is as easy to use as the standard model. Completely equipped for regular, wide-angle, and telephoto movies, only \$149.50 . . . or as little as \$14.95 down.

NEW CINE-KODAK SHOWTIME 8 PROJECTOR shows 8mm movies 5-feet wide! New de luxe model features a handy variable-speed control. Projects extra-brilliant half-hour shows with one simplified loading; "stills," reverse action, too! Illuminated control panel. Lubricated for life. Complete in built-in case, \$129.50, or \$12 down.

Standard model (without variable-speed control) lists at \$115, or \$11 down.



Ask your dealer about small down payment, easy terms

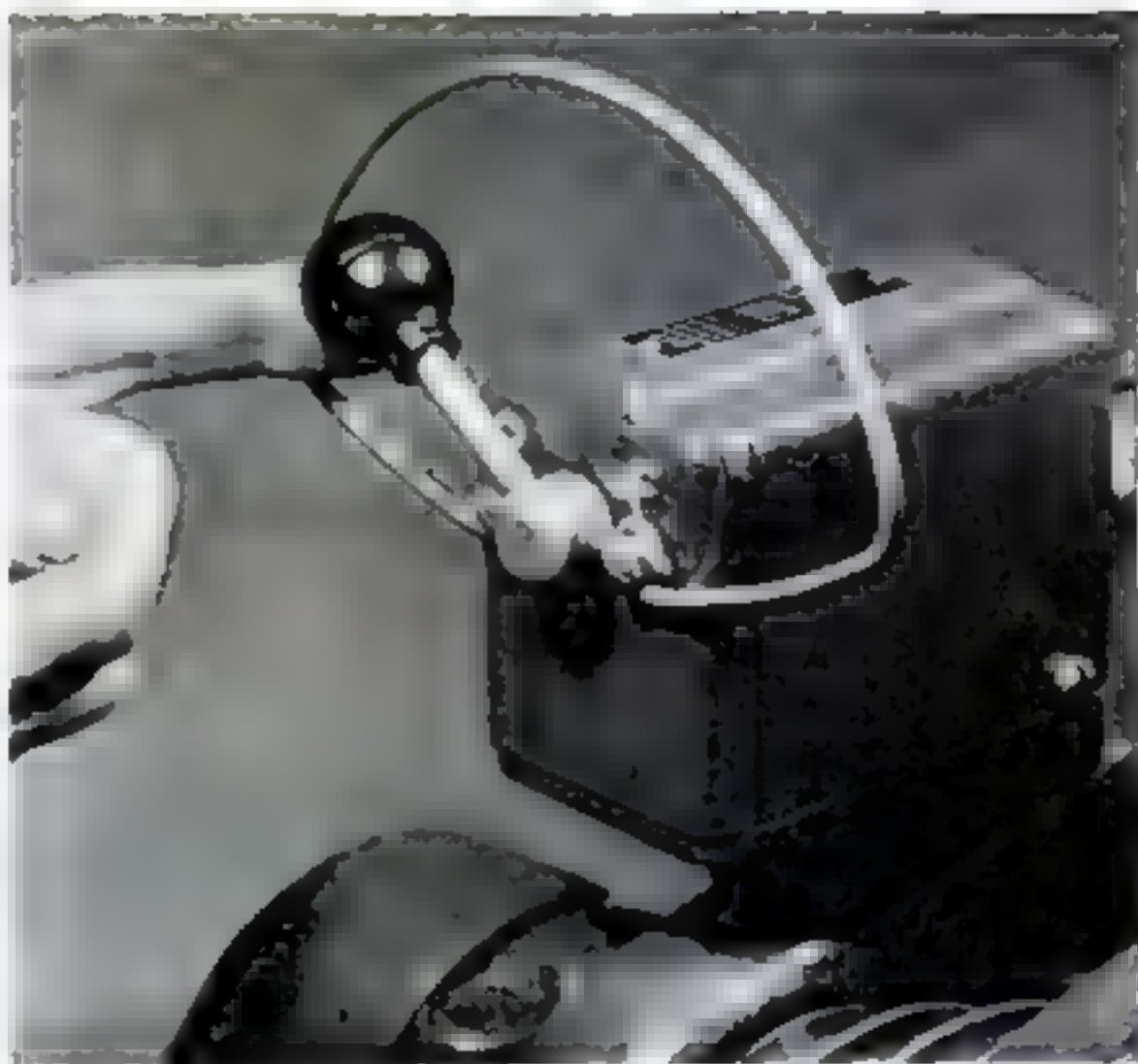
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak
TRADE MARK

Short Cuts and Tips

Bent Wire Guards Power-Tool Switch

AFTER accidentally bumping the switch handle on my lathe to the "on" position a few times, I added a guard. It is just a piece of stiff galvanized wire with the ends looped around two bolts on the switch housing. It is big enough to leave plenty of finger room for operating the handle.—*Walter E. Burton, Akron, Ohio.*



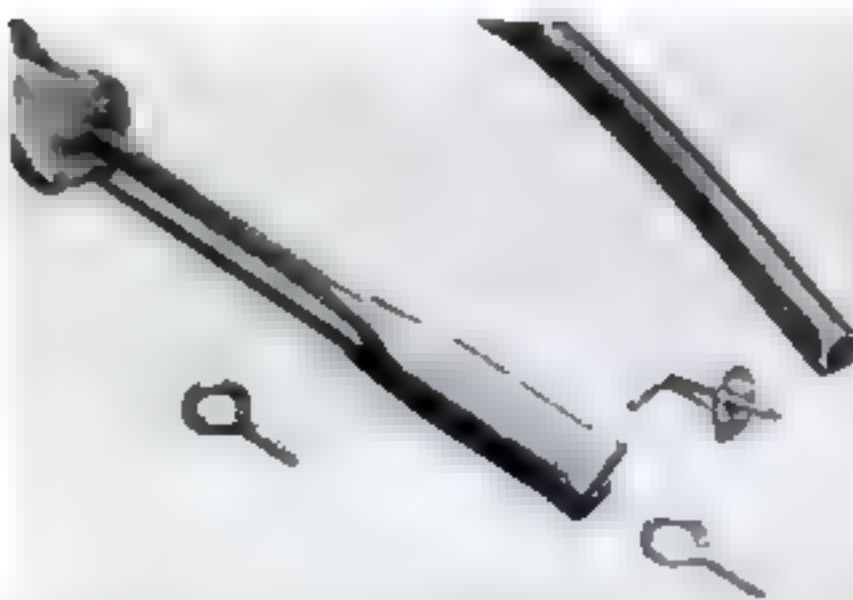
Snap Pin Holds Garden Gloves

THE place for a pair of gardener's gloves is in the tool shed or wherever the tools are kept. A common snap clothespin nailed to the wall through one leg will keep them handy and allow them to dry fast when they get wet.—*Victor H. Lamoey, Upper Jay, N.Y.*



Calking Tube Helps Pouring

A DISCARDED calking tube makes a handy funnel for pouring liquid into small-mouthed containers. To remove the metal discharging disk, insert a piece of stiff wire through the nozzle end of the tube and push it out through the other end. A good washing with gasoline or turpentine will clean out the old calking compound.—*W. B. Eagan, Floyds Knobs, Ind.*

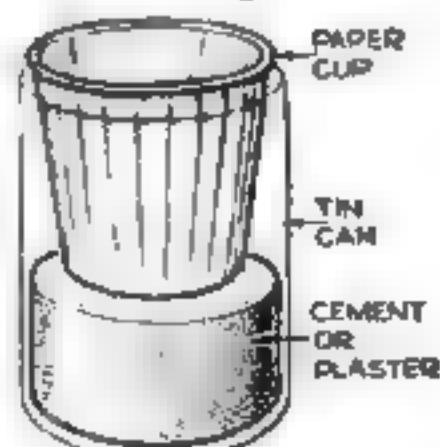


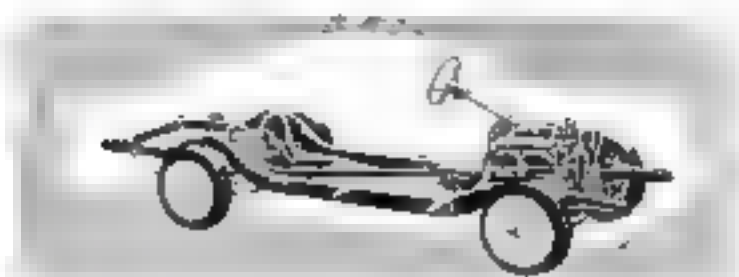
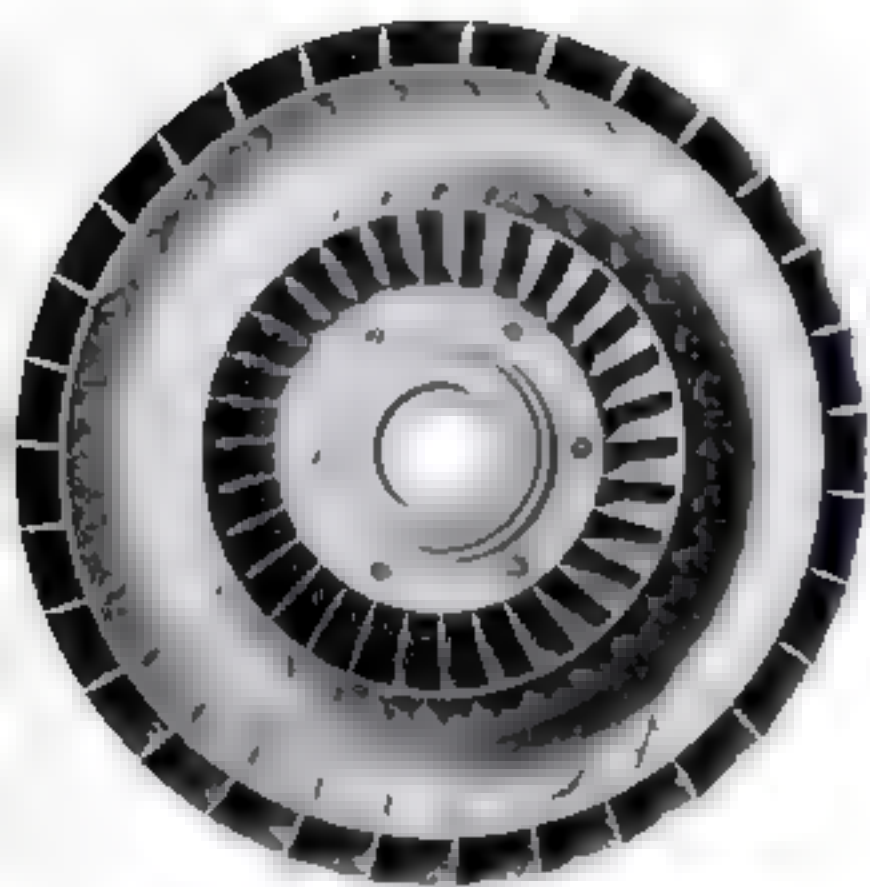
Flat Tube Turns Screw Eye

A FLATTENED piece of copper tubing pushed over the blade of a screwdriver is a handy tool for turning screw eyes and cup hooks. Flatten the end of the tubing just enough to fit over the screw eye; then slip the other end over the screwdriver tip and hammer it down to a tight fit.—*Albert B. Walter, Sandusky, Ohio.*

Tin Can Supports Glue Cup

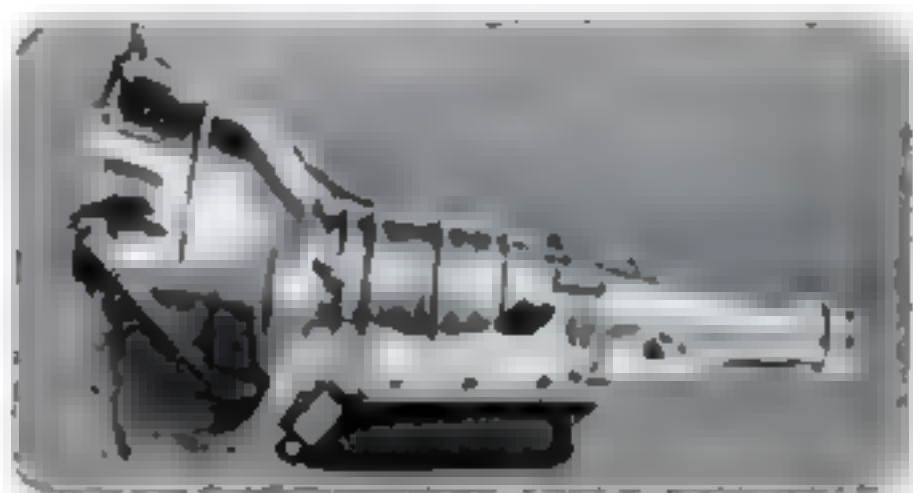
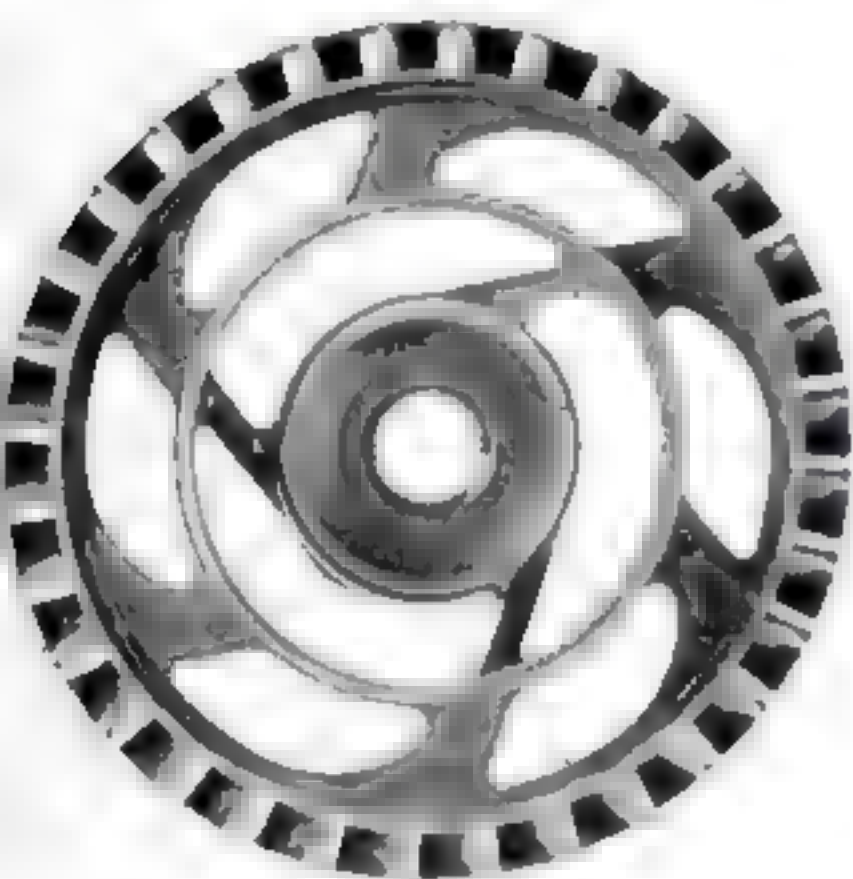
A TIN can forms a practical support for paper cups used to mix glue. Weight it with enough plaster or cement to lift the cup rim just above the can rim.—*A. V. Malone, Glendora, Calif.*





X-RAY ON CHEVROLET

TURBOGLIDE: forecast of the future



You don't have to look on the drawing boards—the answer is plain in any Turboglide-equipped 1957 Chevrolet. Here is tomorrow's drive, with an absolutely shift-free sweep of power, smooth as a plume of steam. Here is a quadrant that doesn't say "LO"—because there is *no* auxiliary planetary gear system needed. Here are *three* turbines for full-torque take-off, brilliant passing power and ultra-thrifty cruising. Here is the finger-flick Hill Retarder for safer slowing on grades . . . all this in a transmission that weighs 30 percent less than any other automatic drive (thanks to the largest production aluminum die casting in the world), with fewer parts, far fewer external openings and absolutely no delicate automatic shift valves. It's an engineering triumph—because it moves without a hint of mechanism. Try it and see! . . . *Chevrolet Division of General Motors, Detroit 2, Michigan.*



Short Cuts and Tips

Stepped Stop Sets Depth of Drill

You can drill holes accurately to any depth with a stepped stop. Make it from $\frac{3}{4}$ " hardwood so it will stand a lot of use.

With a backsaw or band-saw, cut a series of $\frac{1}{8}$ " or $\frac{1}{4}$ " steps $\frac{3}{4}$ " square. Then drill a $\frac{1}{4}$ " hole through the center of each, being sure to get them perpendicular. Don't try to calibrate the steps, as drills of different sizes vary in length.

To use the gauge, chuck the drill and try it in the various holes. Measure the amount it extends through the gauge

until you find a step that will give the required drilling depth. You can get more precise adjustment by loosening the chuck and moving the drill out a little farther.—*R. & J. Capotosto, Flushing, N. Y.*



Coat Hangers Make Doll Rocker

DOLL furniture can be fitted with rockers made from wooden coat hangers. Dowels secure them firmly, but they can also be glued and nailed to the legs.—*George Lemmons, Akron, Ohio.*

▶▶▶ WHEN you sand hardwood with fine sandpaper, collect some of the clean dust. Keep labeled jars of different kinds of wood and you can mix up a small amount of dust with a nonstaining glue when you need a matching wood filler for a job.—*Hugh F. Williamson, Butte, Mont.*

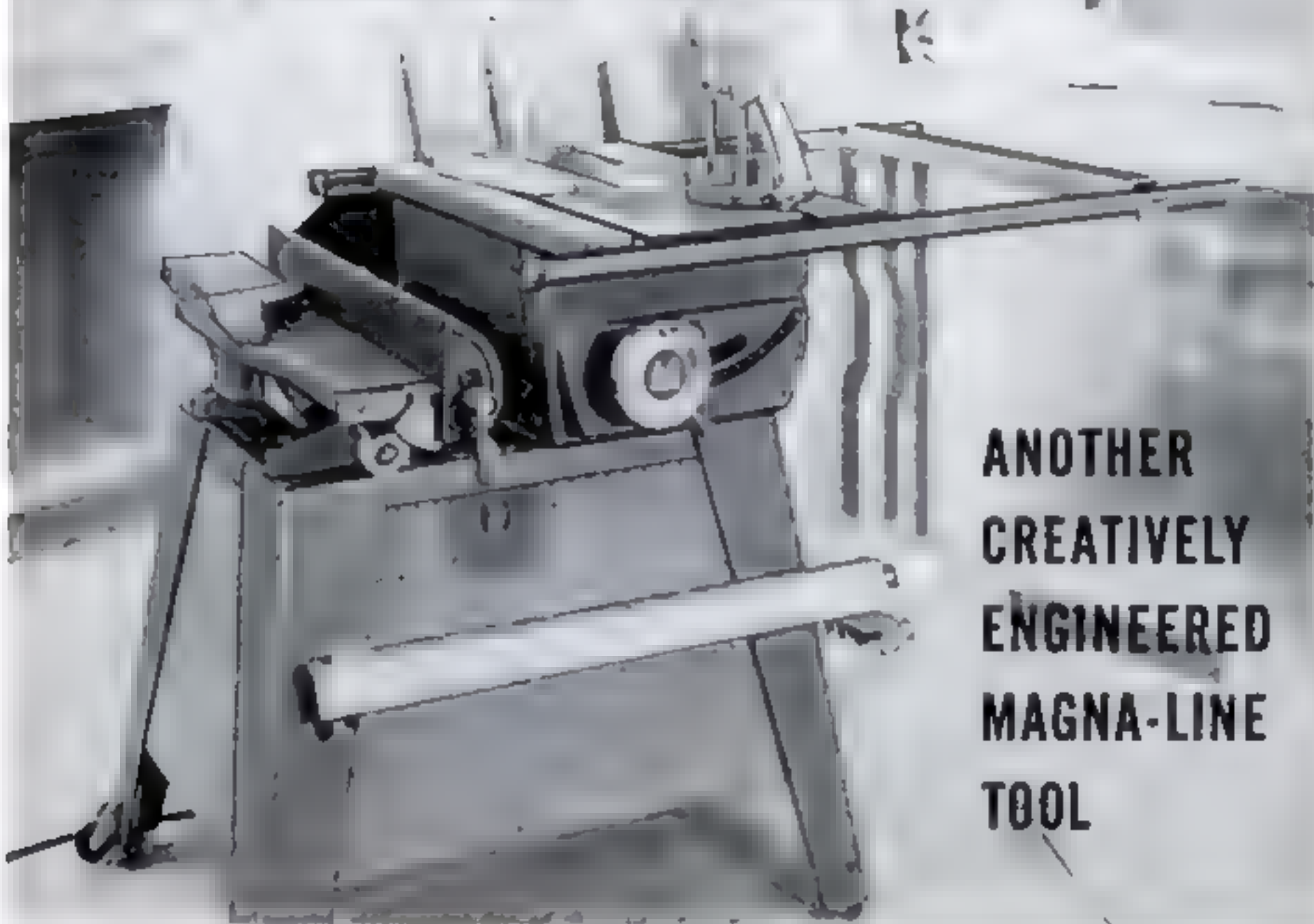


Magnifier Prevents Errors

You can be sure of an accurate reading when using a meter-type instrument if you place a small magnifying lens over its face. Lens focal length should be short—less than 2". If there's not enough space between the cover glass and the dial to give appreciable magnification, wrap the rim of the lens with tape to raise it.—*B. E. Wilson, Chicago.*

NEW!

MAGNA SAW-JOINTER gives you PROFESSIONAL CAPACITY!



ANOTHER
CREATIVELY
ENGINEERED
MAGNA-LINE
TOOL

THE NEW MAGNA Saw-Jointer combination gives you the finest 9-in. Saw and 4-in. Jointer ever made! It's the only tilt arbor saw with a built-in extension ("The Helping Hand") at no extra cost, giving you the largest (32" x 24") effective table on the market! Single-knob control — push for blade height, pull for tilt • Speed-gear control gives you 45° tilt with only 10 turns of knob (40 to 60 turns on other saws!) • Many other completely new, *creatively engineered* features! The big, heavy-duty MAGNA 4-in. Jointer operates at any height of saw blade! It has the longest (28") table, largest (21 3/4" x 3") fence in its class • 3 high-speed,

safety-tapered knives are micro-adjustable • One-piece fence casting is far more rigid, larger!

You can even buy the Saw now and add the Jointer later, with the MAGNA Saw-Jointer Adaptor Kit!

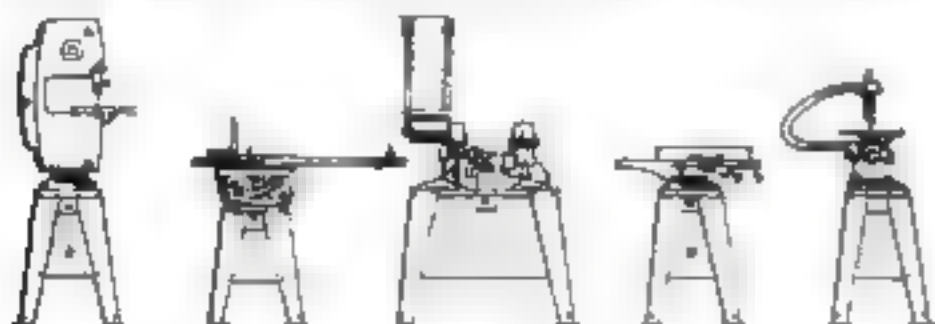
\$199²⁰

(less motor)
Panels, Pistol-Grip,
Casters optional.

**YOU CAN OWN IT FOR
ONLY \$2.07 A WEEK!**



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America's Finest Power Tools



See these other all-new MAGNA-LINE tools: (l to r) 11" Band Saw, 9" Saw, 6" Belt Sander, Compressor-Sprayer, 4" Jointer, 18" Jigsaw.

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Menlo Park, Calif., OR Box 2808, Ft. Wayne, Ind.

*Please send me a free 16-page catalog describing the
Magna Saw-Jointer and the complete Magna-Line.*

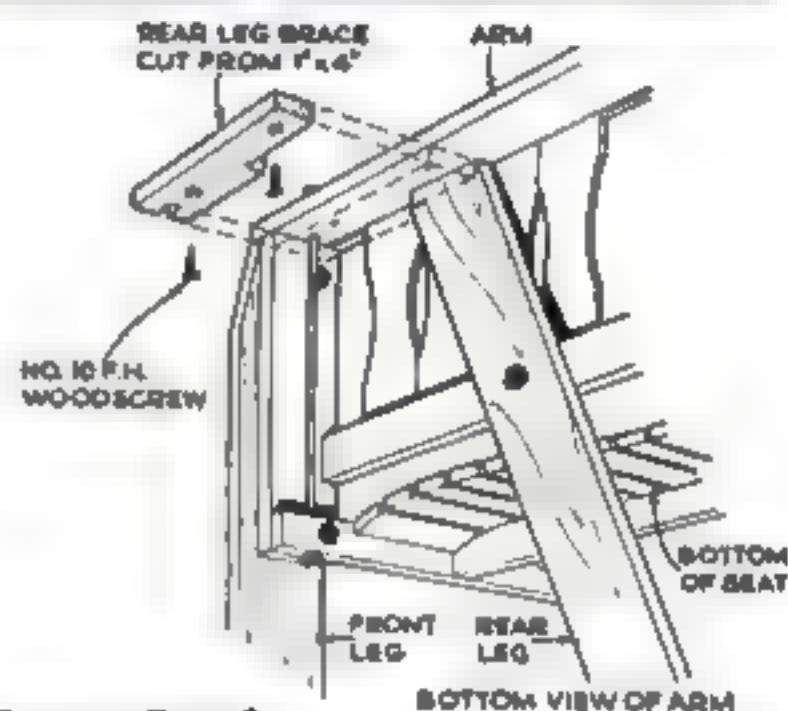
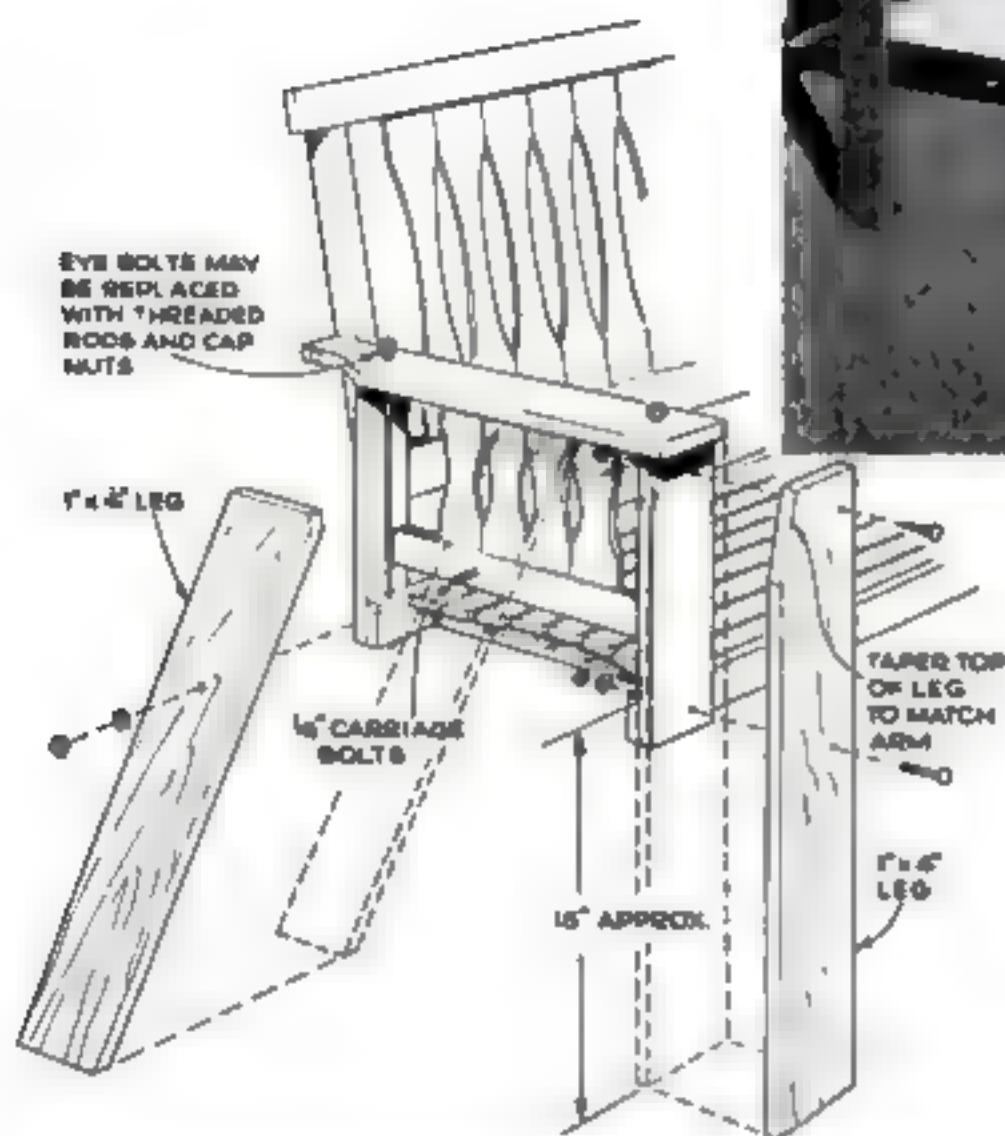
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Short Cuts and Tips



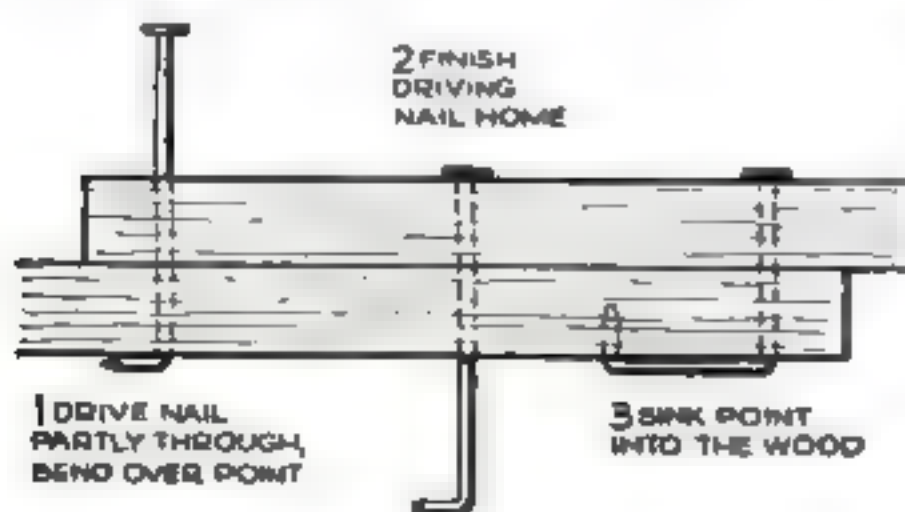
Old Porch Swing Converts to Outdoor Love Seat

A PORCH swing, stored away and idle, can be converted into a love seat for the lawn. Tightening the bolts and screws will usually make it as sturdy as ever. To complete the job, add four legs, two braces and a couple of coats of paint.

Begin by propping the swing on boxes to the desired height above a level floor. About 15" is a good height at the front. Let it slope toward the rear so that the back of the seat will be 1" lower. Cut a

cardboard template for the rear legs. Clamp two pieces of stock together and saw both from this pattern at the same time. Then clamp the two legs in place.

Before cutting the front legs to final length, clamp them to the arm fronts and try out the bench. Adjust height until the seat is comfortable; then secure all four legs with $\frac{1}{4}$ " bolts. Fit the two leg braces under the arms and screw them on.—*D. M. Swartwout, Evanston, Ill.*



How to Clinch a Nail

A CLINCHED nail will hold better and won't snag if the point is buried in the wood. Drive the nail part way through, until about $\frac{1}{2}$ " shows, and then hammer the protruding part over flat. Finish driving, and bend again to embed the point.

For best grip, bend the nail *across* the grain; for a smooth surface, *with* the grain.—*Andrew Vena, Philadelphia.*



WHEN CARS GO WADING...

SOMETIMES your car has to *navigate*... on flooded roads... crossing deep puddles after heavy rain... fording a small stream.

Resist that impulse... don't rush! Water resents being "pushed" around. The sudden shock of hitting it *fast* may stall your engine. Splashed water, sucked in by the fan, can give your engine a shower bath and short circuit the plugs

and maybe the distributor. Result — you may have a *dead engine*.

Instead, do wade *slowly* in low gear. If your engine *does* get splashed, you can hope the heat will dry it. If not, and your engine sputters, dry the spark plugs and the distributor with a cloth.

Another warning: when water covers the exhaust pipe, engines stop. It can mean a tow job to get you out.



PROTECT your car's lifeline



Automatic transmissions need careful servicing. Texaco Dealers are specially trained to service them... use only Texaco *Texamatic* automatic transmission fluid, the one which has been most widely used for original filling. See your Texaco Dealer — the *best friend* your car has ever had.

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Short Cuts and Tips

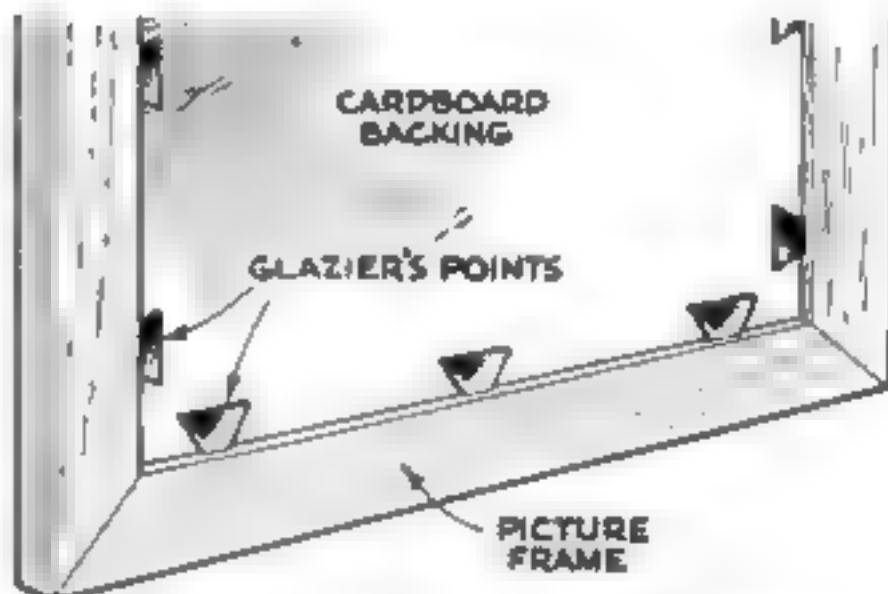


Crayon Dulls Plumb-Bob Shine

IF THE point of a plated plumb bob is too shiny, you may have trouble positioning it accurately over the center of a stake nail when staking out a building. Make the point easier to see by blackening it with a marking crayon; or cover it by sticking on a small piece of black masking tape.—*Murny Kent, Detroit, Mich.*

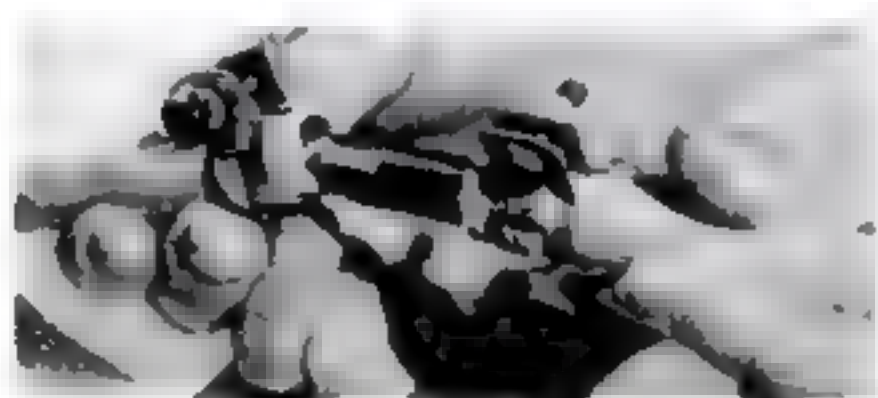
How to Make a Built-In Funnel

A HANDY container that's easy to carry, and to pour from, can be made from any tin can. Open the top three-fourths around and roll back this flap to form a handle. Then punch a pouring hole near the rim in the uncut portion of the top and you will have a built-in funnel.—*Harold W. Frerichs, Olympia, Wash.*



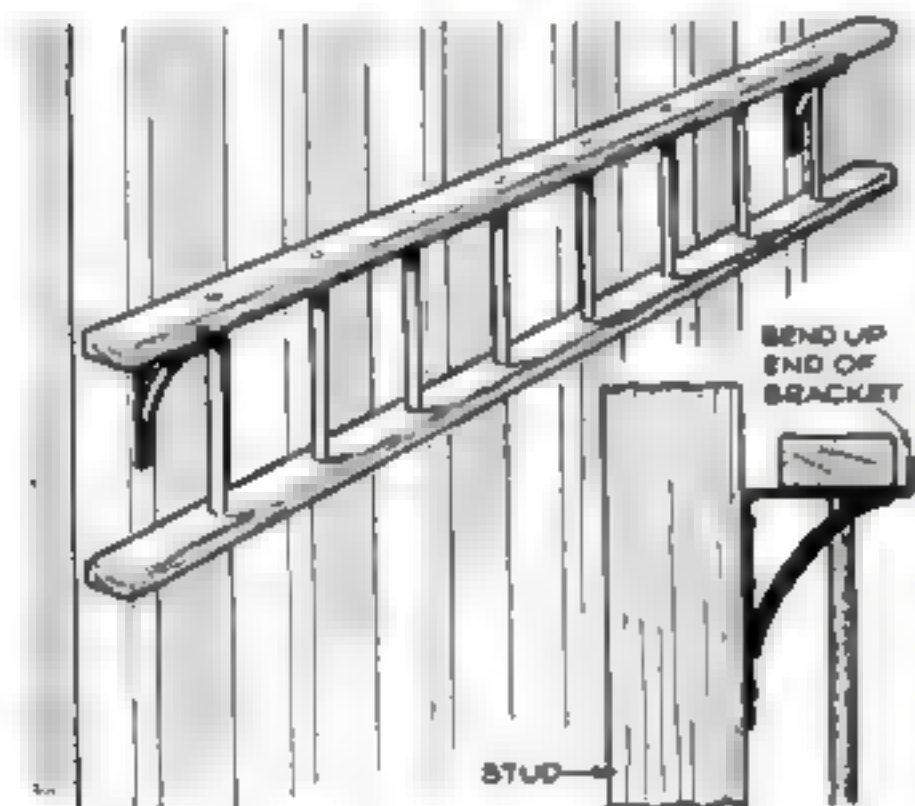
Glazier's Points Hold Pictures

I HAVE found that the little triangular points used for setting window glass are just as handy for fastening the backing in place when you are framing pictures. They go into the frame easily and lie flat without gouging tracks in the cardboard.—*R. M. Woodbury, Natick, Mass.*



Pipe Nipple Joins Tubing

COUPLINGS for standard-size hose are common, but a hardware store may not have one for smaller diameters on hand. You can improvise a coupling by slipping ends of the hose lengths over a short pipe nipple and securing them with small hose clamps.—*James A. Frank, Newark, N. J.*



Brackets Rack Up a Ladder

A PAIR of shelf brackets fastened to the inside studding of a garage or other out-building provides an excellent rack for storing a ladder. A bend at the outer end of the supporting arm of each bracket will keep the ladder from sliding off.—*Victor H. Lamoy, Upper Jay, N. Y.*

Here's the **BIG** **DIFFERENCE**

in HEADLAMPS today!



NOT THE POWER!

All headlamps built today "see" farther down the road, because the power has been increased by a full 10% on the high beam. Objects that formerly blended with the background should now stand out in bold relief. STILL, POWER IS NOT THE BIG DIFFERENCE!



NOT THE LIGHT PATTERN!

More "seeing distance" along the right side of the road is another big industry advance. On the lower beam, you see farther (eighty feet farther) than was ever possible before. This means, of course, more light on the right YET, PATTERN IS NOT THE BIG DIFFERENCE EITHER!



BUT, THE AIM!

Power and pattern are unimportant unless headlamps are properly aimed. Only Guide gem-grinds three reference points, or "Guide Points", into each lens, providing positive aiming accurate within a few thousandths of an inch. TODAY, PERFECT AIM IS THE BIG DIFFERENCE IN HEADLAMPS!

Standard equipment on all General Motors cars and trucks.

GUIDE T-3

Buy In Pairs

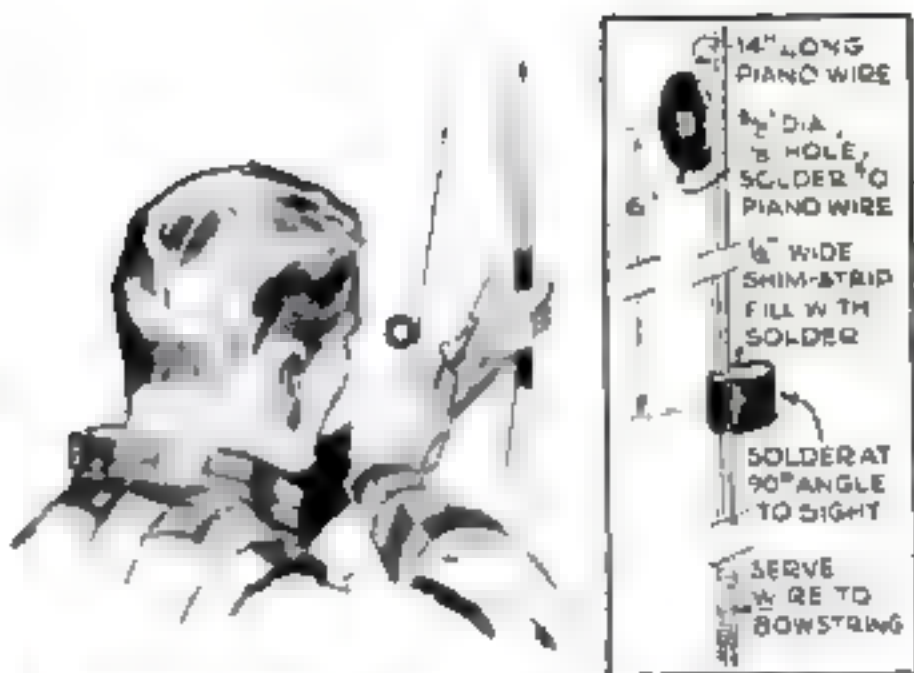
Where You See



Safety-Aim
HEADLAMPS

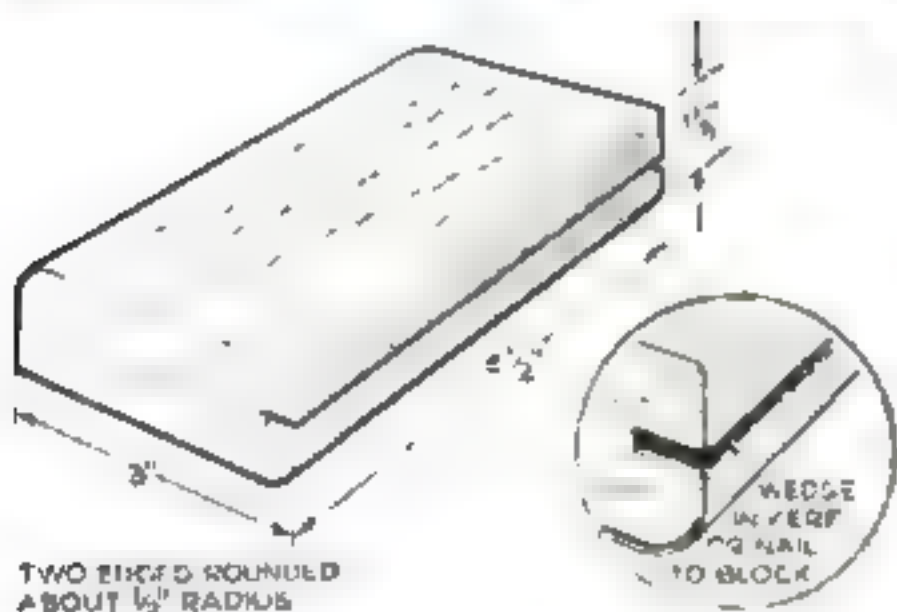
AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

Short Cuts and Tips



Peep Sight Helps Archers

EVEN a novice can hit the bull's-eye with this peep sight attached to his bowstring. Cut the sight from thin metal and solder it near the top of a 14" length of piano wire. At right angles to it, and 6" below, solder a nock piece made of shim brass filled with solder. Place the nock piece, over which the arrow notch fits, at the center of the bowstring, and fasten the assembly in place with thread that is wrapped the entire length of the wire.—*Austin H. Phelps, Omaha, Nebr.*



Shaped Sander Fits Work

A SANDING block with two opposite sides rounded off lets you sand concave surfaces with ease. By changing the position of the block, you get two surfaces for sanding even areas, two right-angle edges for getting into corners, and two rounded edges that reach into hollows when the block is tilted. Half a sheet of sandpaper can be nailed to a 3"-by-5 1/2"-by-1 1/8" block, or wedged into a kerf cut in one side of the block.—*L. Michaels, Gary, Ind.*

▶▶▶ I BLEND two threading lubricants for use on taps and dies. I put a little white lead in a jar or can and thin it with sulfur-base black cutting oil. When stirred vigorously to the consistency of heavy paint, the compound works well when doing either hand or machine threading.—*R. V. Thomaston, Ames, Iowa.*



Takes a Nail to Remove a Nail

WHEN repairing old chairs, you sometimes find joints that have been pinned with a brad or other thin nail. It's a problem to free the pin without damaging the wood. File or grind the point of another nail flat and punch the imbedded one through. When the pin emerges on the other side pull it out with nippers.

now, in power tools, too,
if it's Remington, it's right!



the famous 149 B Power Drill has 5 great features that make it right for you!

only
\$28.50*

- Precision geared chuck for greater accuracy!
- Heat treated gears for longer life!
- Balanced armatures for smoother running!
- Anti-heating fan for cooler operation and longer wear!
- Die cast aluminum alloy housing for light weight...longer life!

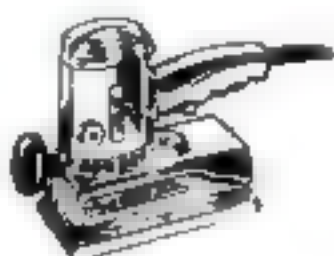
MODEL 149B. 3/4-inch drill, AC-DC 25 to 60 cycle, 115 volts 2500 rpm. free speed, 1500 rpm. load speed, 3 lbs., U. L. approved

Remington *Mall*

MALL TOOL COMPANY
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Electric Saws for every carpentry job.



Belt and Orbital type sanders.

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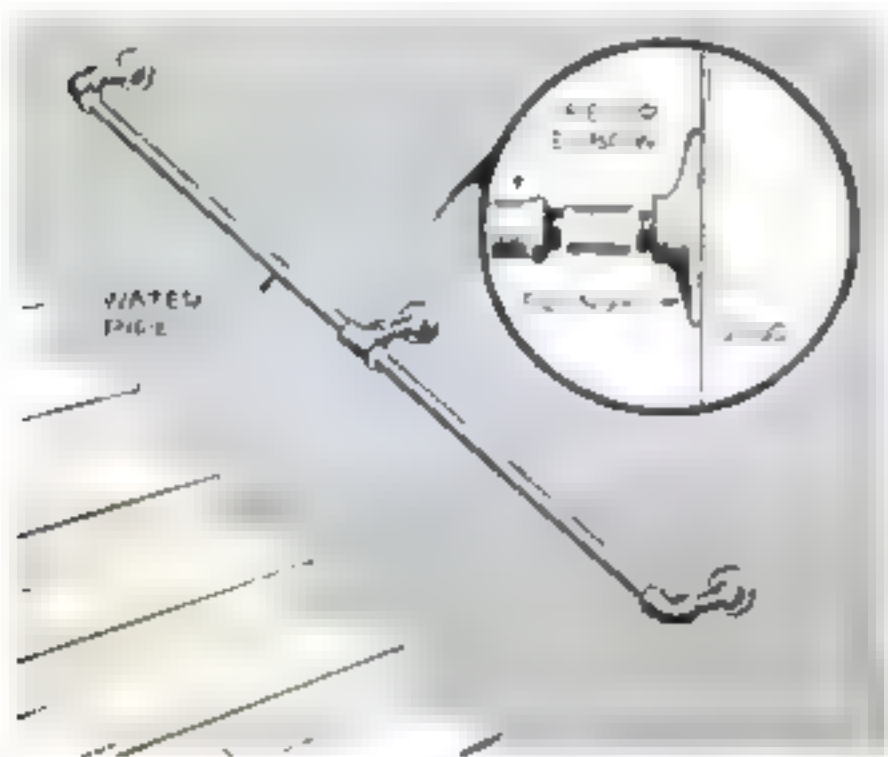
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Short Cuts and Tips



Rolled Screen Makes Brush

A STRIP of wire screening makes a good brush for clearing rust from tools, flaking paint from metal, and similar scraping jobs. Fray out some horizontal strands on the long side of the strip and roll it up. Bind the roll with wire and wedge it into a sturdy jar or a deep jar cap. As the wire bristles wear down, take the screening out and lengthen them again.—*Frank A. Jackson, Newark, N. J.*



Pipe Makes Simple Stair Rail

A CHEAP but sturdy stair rail for basement or attic stairs can be made from two lengths of water pipe joined with a tee. A 3" or 4" nipple is turned into the tee and into elbows at each end of the rail. Cap the nipples with pipe flanges and screw the rail at each end to the wall studs.—*Victor Lambert, Rochester, N. Y.*



Photo Meter Checks Headlights

EVEN after properly marking a garage door and aiming each sealed-beam headlight separately, I wasn't sure that the bright spot was perfectly "on target." That is, I wasn't until I tried using my exposure meter. Holding it against the door and pointing it towards the uncovered headlight, I found that it indicated the exact position of the bright spot.—*Marshall Woodson, Corning, Calif.*

▶▶▶IF YOUR tin shears refuse to cut even though you sharpen the edges, try this: Separate the halves and grind down the inside faces just around the pivot holes. This should bring the two cutting edges closer together so that they will bite properly into the metal that you want to cut.—*R. F. Schleicher, Bloomsburg, Pa.*



Wax Protects Tools in Use

A COATING of grease or an airtight wrap is fine for stored tools, but what about those you use all the time? I protect these with a coating of hard paste wax, rubbing it on as though I were polishing the tools. This not only seals out moisture, but sheds shop dust as well.—*A. J. Franklin, North Bergen, N. J.*

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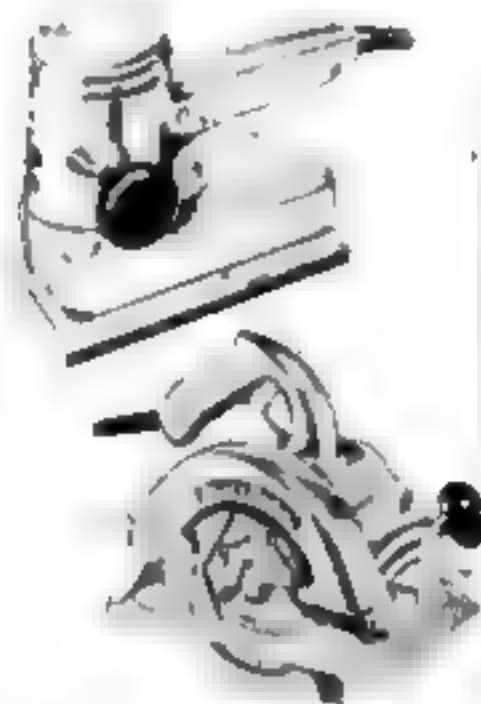
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50 FOURTH PRIZES—each worth more than \$70! Winners get (1) Black & Decker Utility $\frac{1}{4}$ " Drill; (2) your choice of \$30 worth of Stanley hand tools; (3) your choice of \$25 worth of Weldwood products.

50 FIFTH PRIZES—each winner to get his choice of \$25 worth of Weldwood products.

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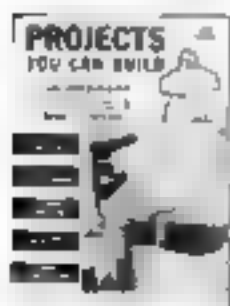


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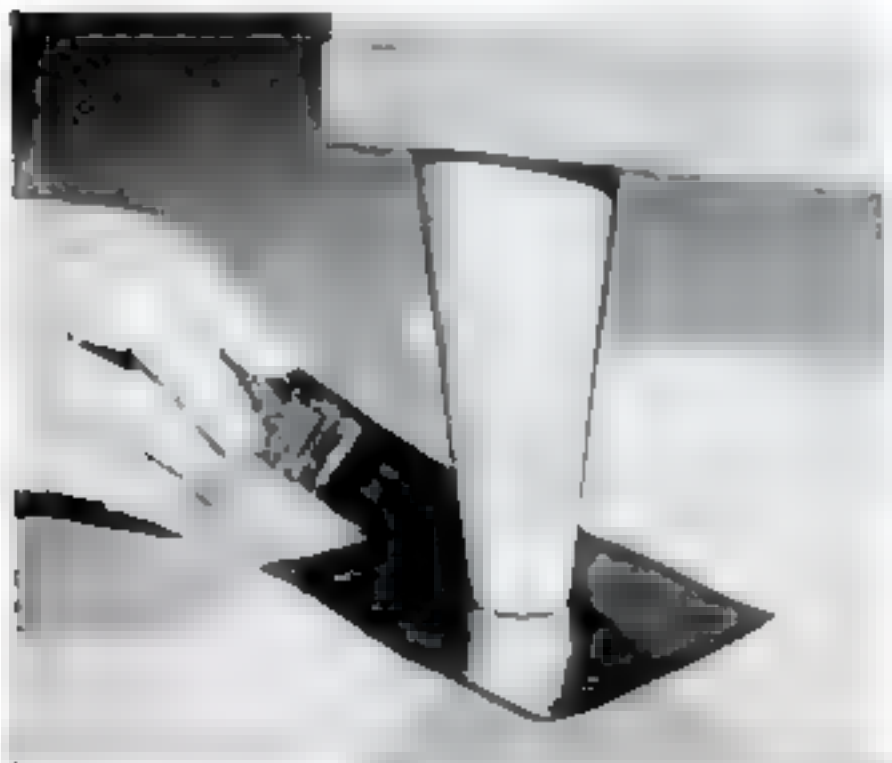
Pine Plywood Contest

Short Cuts and Tips



Pipe Fence Frame Carries Water

AFTER installing a wire fence on a framework of galvanized pipe, I hit on the idea of running water through the piping that forms the top rail. Now I have a faucet at each corner post. I can water my lawn without lugging a long and heavy hose, and stop off for a drink if I'm thirsty.—*J. R. Rogers, Tulsa, Okla.*



Foil Paint Catcher Saves Work

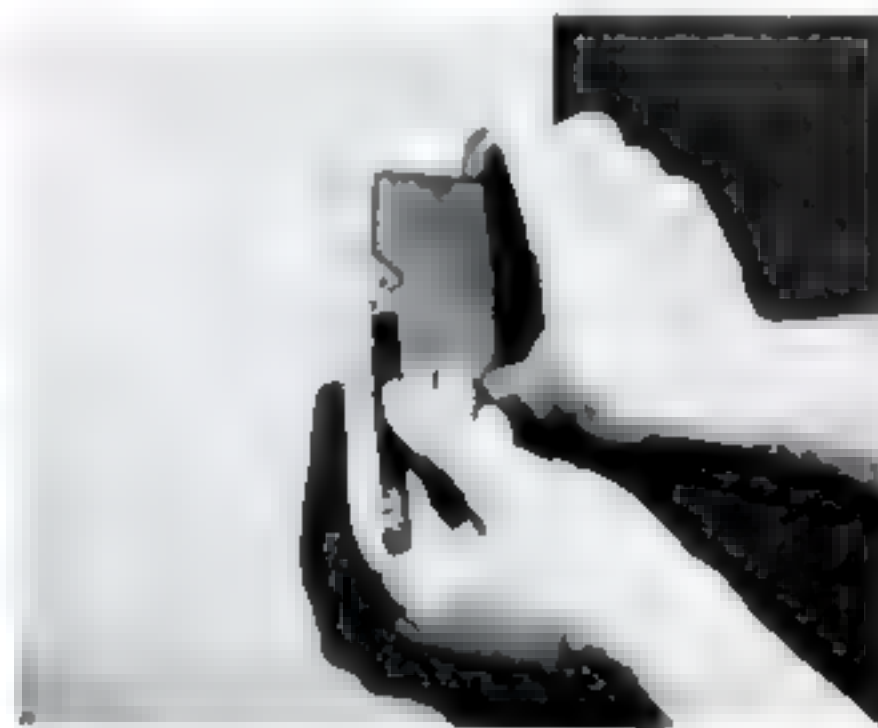
FRESHLY painted chairs and other pieces of furniture usually stick to newspapers laid to protect the floor. A square of aluminum foil slipped under each leg of the furniture will break away cleanly.



Oilstone Joins Saw Blades

IF YOU sharpen your own power-saw blades, you can joint a blade in the saw before removing it for filing. Run the blade down almost flush with the table top, then touch the tips of the teeth lightly with an old oilstone while the saw is running. This will even the teeth prior to filing and setting. Wrap paper around the oilstone to protect the table top.—*C. C. Colson, Buffalo, N.Y.*

▶▶▶ Plastic tape will keep small, flat objects from sliding beneath desk drawer dividers. Fold the tape lengthwise and apply it to drawer and divider to seal the crack.—*R. L. Clough, Bristol, N.H.*



V-Cut Block Is Contour Scribe

WHEN fitting panels into a corner, or linoleum against a wall, you may find that the wall is actually curved or crooked. Yet you must follow its curve to make a neat joint. A block of wood with a notch in one end will help you do it. Press the block into a corner, holding a pencil in the notch. With the panel in place, slide the block along the wall. This will give you the right cutting line.—*F. A. Javez, Newark, N.J.*

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Why Your Car Engine Grows Old

[Continued from page 1, 2]

contains combinations of additives that work to minimize sludge and corrosion.

3. Or you can buy a do-it-yourself additive. One of the newest is Du Pont's "No. 7 M.O.A." (motor-oil additive). It has just been introduced nationally this spring.

M.O.A.'s chemical name is lauryl methacrylate/diethylaminoethyl methacrylate. Its giant molecules, like those of other detergent molecules, wrap around particles of sludge too tiny to be visible and encase them in envelopes, thus preventing them from adhering to other particles of sludge. The tiny particles accordingly remain suspended in the oil, easily pass through screen and filter and are drained off when the oil is changed.

Du Pont does not claim that its No. "7" M.O.A. dissolves sludge already formed, but it maintains that the new motor-oil additive prevents additional sludge from collecting, at both low and high driving temperatures.

Du Pont researchers also announced that No. "7" M.O.A. maintains more uniform oil viscosity under all driving conditions, so that the oil is thin enough for low-temperature operations and still does not get too thin at high temperatures.

Before No. "7" M.O.A. was put on the market, it was tested, in comparison with 10 other additives, in a fleet of taxicabs. Each cab was driven 50,000 miles under conditions most conducive to the formation of sludge. Then the engines were taken apart. Those that had used the new chemical were nearly as clean as when they started the test, and showed little wear. Many of the others were choking with sludge; some revealed heavy wear on camshaft exhaust and intake lobes and on the rocker-arm shafts.

No. "7" M.O.A. was the only one of the additives tested that worked well in water-contaminated crankcases. And the presence of water is the chief reason why low-temperature driving with ordinary motor oil produces so much sludge.

Even with an additive, whether tailored into the oil by the refiner or added

later, piston-ring wear is very high when cylinder-wall temperature is low. For instance, when the temperature of cylinder walls is only 100 degrees, piston-ring wear has been found to be more than 25 times as great as when the walls are 160 degrees. In cold starts, moreover, there are periods when the walls are far below 100. The only practicable solution is to minimize cold starts, and to make sure the engine is allowed to warm up. For this a properly working thermostat, preferably a high-temperature one (180 degrees) is advisable.

To combat the problem of low spark-plug nose temperatures in stop-and-go driving, be sure to clean your car's plugs every 5,000 miles, or whenever one mis-

.....
Ordinary cars? Not on your life! Cop cars are souped up plenty. Read "Why You Can't Outrun the Police" in May PS.
.....

fires. Better still, change to hotter-range plugs. These bring the temperature up quickly when you are making slow, short trips.

Use a corrosion inhibitor to prevent the accumulation of rusted scale in the car's cooling system. Scale interferes with the proper functioning of the thermostat and, paradoxically, can cause your engine to run cold.

On cold mornings, don't start your car and let it run for a long while without moving. The car's heater warms *you*—but the engine, with almost no work to do, is not getting comparably warm. And it is forming sludge at an accelerated rate.

There is a simple but effective way to deal with the problem of corrosive liquids in your car's exhaust pipe and muffler. Next time you have the car serviced, ask the serviceman to free the drain hole in the bottom of the exhaust muffler. It gets clogged with rusted scale, thus allowing corrosive liquids to pool inside. The point of an ice pick will free the drain hole in a jiffy. END



Wizard Tune-Up Kit makes it easy to "tune" ignition system. Complete kit with heavy duty points, condenser, rotor. Saves gas, makes car start easier, run smoother, perform better. Easy instructions. All popular cars. (1407-01). From \$1.15



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(NOTE: In some areas of the U.S., Canada, Mexico, and Puerto Rico, prices slightly higher. Western Auto Associate Stores and their own prices, terms and conditions. 1957)

Superchargers Spur Horsepower Race

(Continued from page 109)

No exact figures on the blown Ford or Thunderbird are available at this writing, but they should both be fully as rapid.

Some comparisons between the blown and the standard 312-cu.-in. Ford V-8 (with four-barrel carburetor) have, however, come from Dearborn. The supercharged 300-hp. job accelerated from 0 to 60 m.p.h. 26 percent faster than the standard 245-hp. model. It covered 25 percent more distance in the first 10 seconds after a standing start. A 1956 T-Bird with standard McCulloch blower and owned by movie star Clark Gable has done 0 to 60 m.p.h. in a smoking six seconds flat.

Every hop-up trick exacts a price and supercharging is no exception. A blown Hawk, for example, *can* deliver 16 m.p.g.—on level ground with a steady foot on the gas pedal. The variable-rate pulley makes this possible. At modest speed the low-boost rate takes over automatically and virtually no extra fuel is used. But the instant you bear down on the pedal a pulley change throws the blower into high-boost operation. The extra performance it gives needs extra gas, naturally.

Engine stresses and wear are inevitably greater, though factory engineers claim that the margins of reserve are ample. Spark plugs would be expected to burn up faster in the hotter confines of a supercharged cylinder, but both Studebaker and Ford claim plug life equals that on any V-8 engine. Ford has not changed plugs, by the way, though Studebaker uses a cooler firing one in the Hawk.

Fan belts, with a heavy load to spin, might be expected to wear out before their time. Not so, says Michael P. deBlumenthal, S-P's chief engineer. On the South Bend proving ground a Hawk logged over 38,000 miles without showing a sign of belt wear.

Blower noise is no factor at all in the new Clipper. But the Golden Hawk lets it be known, deliberately, that there is

plenty of authority under the sheet metal. A motorist who buys a semi-sports car wants to hear a little jet-like reaction, so the theory goes.

That's just what I got in moderate quantities while driving a Hawk. Up to about 60 m.p.h. blower noise was scarcely audible above normal road and wind noise. As the car accelerated beyond 60, however, the supercharger began to whine, its pitch increasing with speed. Even so, the blower noise is not irritating. The engine simply announces that up to 60 it's just been loafing along, but now it's ready to show it can hustle when asked.

I found only one flaw, a minor one, in the Golden Hawk: On cold mornings, engine warmup takes an agonizingly long time.

The Ford decision to offer supercharging was undoubtedly influenced by concern over Chevrolet's fuel injection. Off to its best sales start against its archrival in over two decades, Ford was unwilling to pass up any advantage, however slim.

For Studebaker-Packard, supercharging was practically mandatory to avoid the high crime of reducing horsepower from one model year to the next. Last year's Golden Hawk obtained 275 hp. from its big (352-cu.-in.) Packard engine. But this engine has gone out of production and Studebaker must use its own smaller (289-cu.-in.) V-8, rated at 210 hp. with a carburetor. Obviously the 65-hp. deficiency had to be made up, and the supercharger bridged the wide gap.

Price-wise, S-P is better off than Ford. The unit is standard on Golden Hawk and Clipper, yet there has been no material increase in price over last year. Studebaker was able to hold costs in check mainly because it no longer must buy the comparatively expensive Packard engine from an "outside" supplier. Golden Hawk prices advanced only half the industry's average boost of 7½ percent.

END



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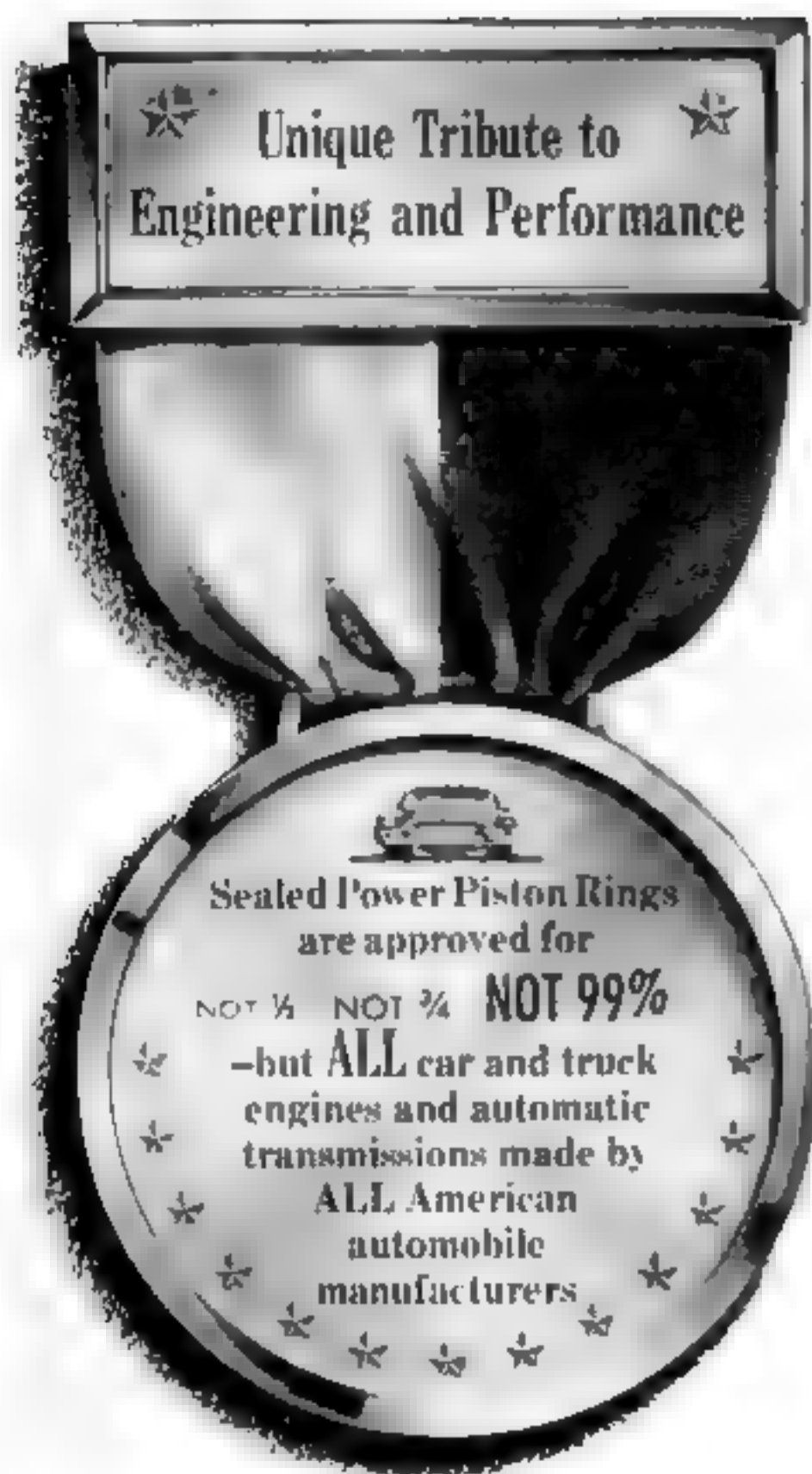
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Don't Believe These Tales About Rattlers

(Continued from page 117)

the Atlantic to be applied to rattlesnakes, is that of the child who befriends a snake. In the usual version a child, generally a girl, repeatedly carries her lunch out into the yard to eat. Finally the curiosity of her parents is aroused; they follow her and watch her sit down to enjoy her bowl of bread and milk. At once a huge snake—often a rattlesnake, if told in the United States—issues from the grass and coils beside her, to be fed milk and bread with a spoon. The horrified parents destroy the snake, with the result that the child, pining for her playmate, goes into a decline and dies.

There are many stories, some no doubt true, some legendary, about children found playing innocently with rattlesnakes. Doubtless this has often happened, since young children are usually not afraid of snakes. Although serious and sad accidents have resulted from occurrences of this kind, many have ended without harm if the rattler has not been frightened or roughly handled. From such has grown the dangerous myth that rattlers won't bite children.

Of all these myths, that which has most deeply affected human impressions and attitudes toward rattlesnakes is the one that pictures these snakes as malignant, vindictive and crafty, with an especial hatred of mankind. Recently a radio commentator called rattlesnakes the "symbol of pure evil."

But a rattlesnake is only a primitive creature with rudimentary perceptions and reactions. Dangerous it surely is, and I hold no brief for its survival except in remote areas where its capacity to destroy harmful rodents may be exercised without danger to man or his domestic animals. But that the rattlesnake bears an especial enmity toward man is mythical. It seeks only to defend itself from injury by intruders of superior size, of which man is one. It could not, through the ages, have developed any special enmity for man, since the first human being any rattlesnake may encounter is usually the last.

END

New Stanley Heavy Duty Sanders

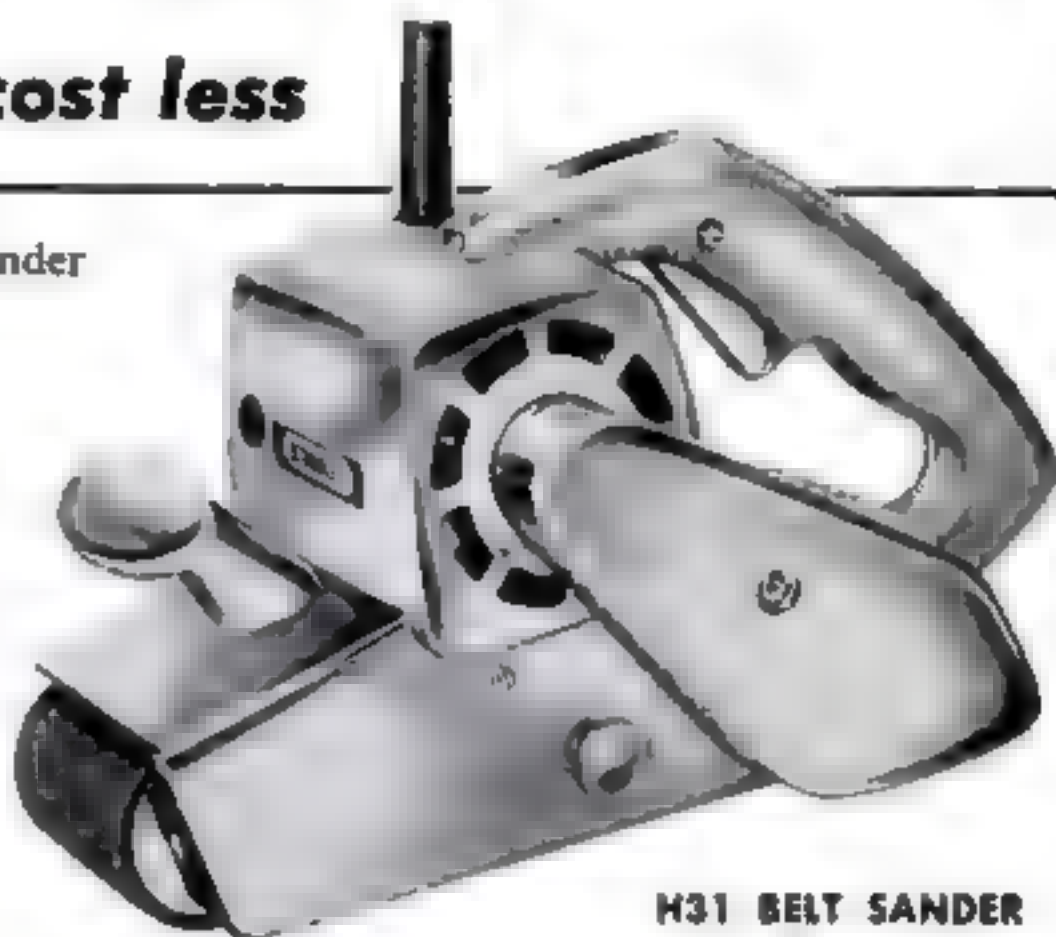
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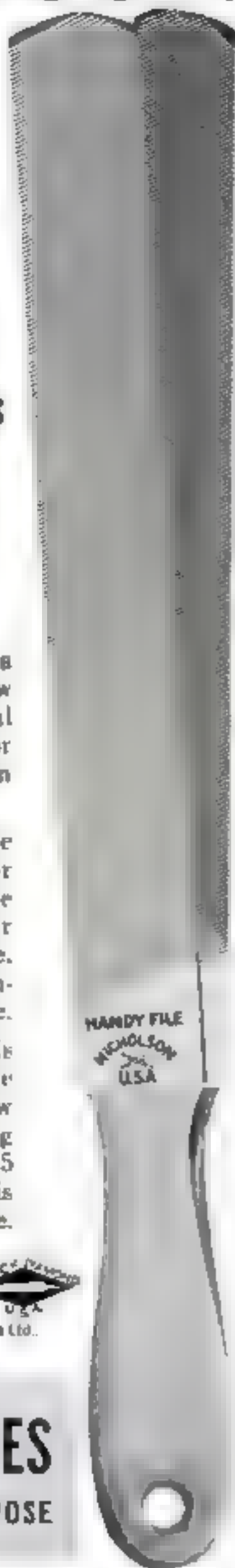


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60 Days and Nights in an Inferno

[Continued from page 131]

surging across the whole width of the newly created lake.

Oil fires are hot enough to melt steel derricks like candles. Akuinu's blaze brought down the 120-foot-high, \$250,000 steel derrick, tumbled it and all its machinery into the crater. The lake swallowed it, as the sea hauls down a sinking ship.

In hours, Akuinu camp had gone; the derrick had disappeared; a brand-new lake was there—in flames. Clark thought the fire department should be called.

Jan. 18

Problem: There are not many fire-fighters oil men can call. "Accidents," explains an oil company's journal, "keep their ranks thin." Canadian Gulf, which owned the Akuinu well, phoned the man known as the world's best oil firefighter: Myron Kinley, down in Houston, Tex.

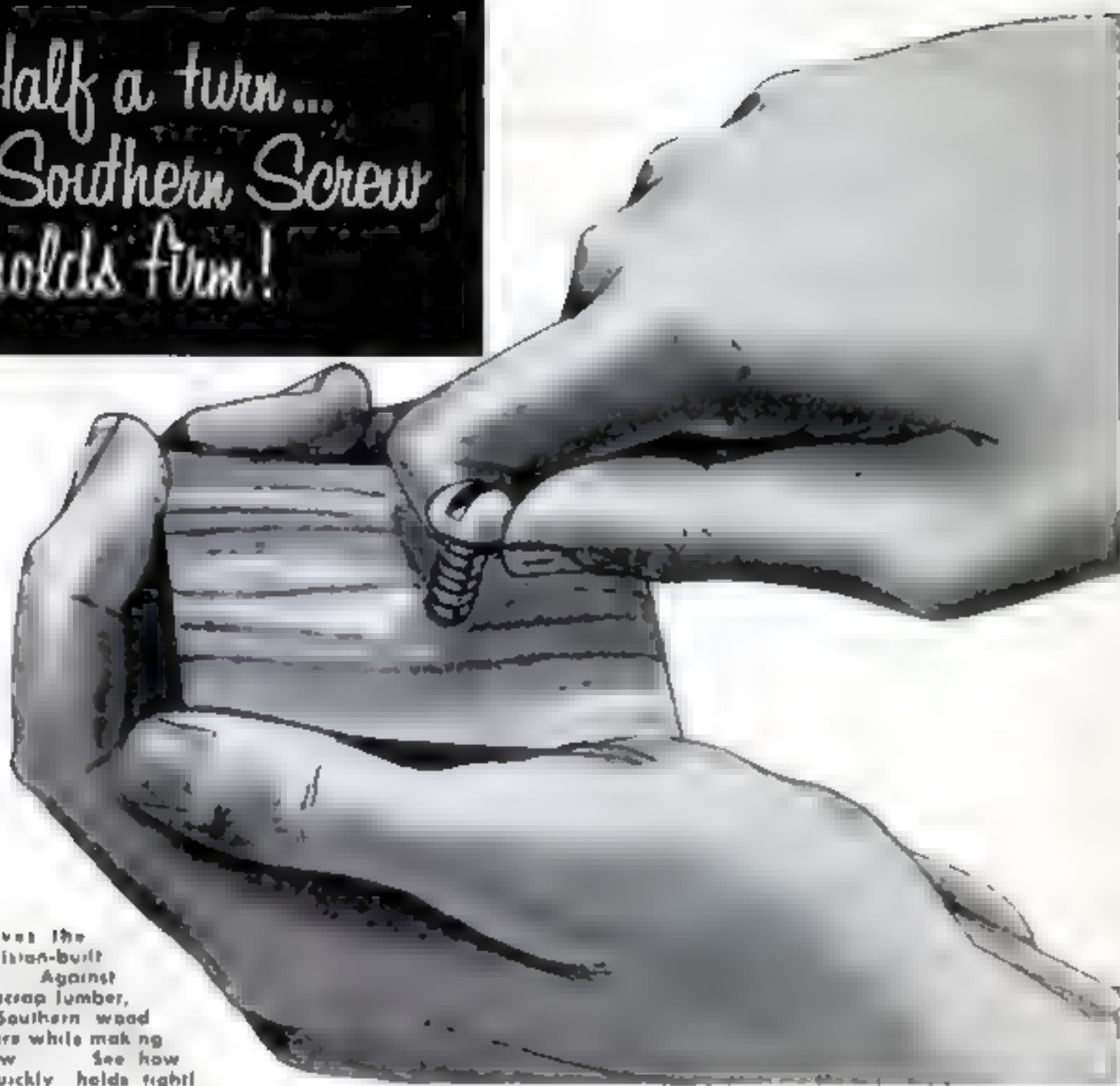
Though the well was 115 miles northwest of Edmonton, in 36 hours five Kinley men, headed by famed Red Adair, were struggling at Akuinu. Kinley's method is to haul away the wreckage, then dynamite the fire in the well. (The blast snuffs out the flames.) But here his men couldn't: Flames, heat and the molten muskeg, which won't support a man, much less a truck, kept them from getting close enough to hook onto the derrick which, after all, was at the bottom of a boiling lake. They had to give up and withdraw.

Jan. 19-25

What you do next, as any oil man tells you and Earl Clark does, is drill another well. Down it you pump water and cement in an effort to seal off the gas. The new well, of course, has to be got down while the fire rages. This one had to be located away (600 feet) from the flames. It had to be angled so its bottom would reach the bottom of the wild well where (everyone believed) the gas was coming from. This would require a small army of men and equip-

[Continued on page 246]

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holds firm!



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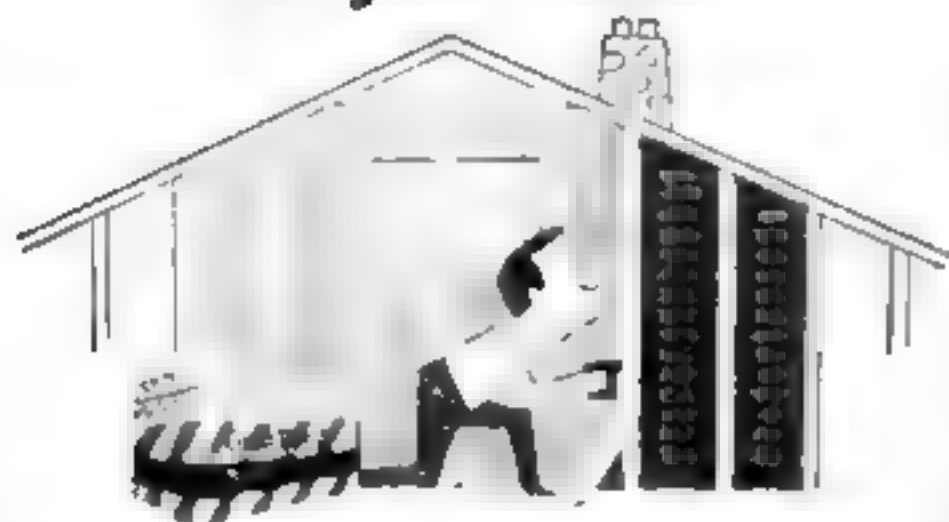
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National Gypsum Company, Buffalo 2, N. Y.



60 Days and Nights in an Inferno

(Continued from page 244)

ment. And two unbridged rivers—the Pembina and the Athabaska—lay between the well and the needed help.

Solution: The men at Akuinu turned to and pumped water onto ice in the rivers till the ice was four to five feet thick and would support trucks, trailers, and bulldozers. Radio rounded up oil-field workers and equipment from all over western Canada. A new derrick was located, lying on the ground awaiting use, at the Stettler oil field a couple of hundred miles away. It arrived on a giant lowboy trailer. Other arrivals: 153 men plus trailers for them to live in; four prefab steam-heated water tanks (for water to be poured down the new well); two prefab pumping stations (to get water from rivers); 43 trucks to cart water from pumping stations to the tanks, which were to be erected at the well site. You couldn't use a pipeline in weather that cold.

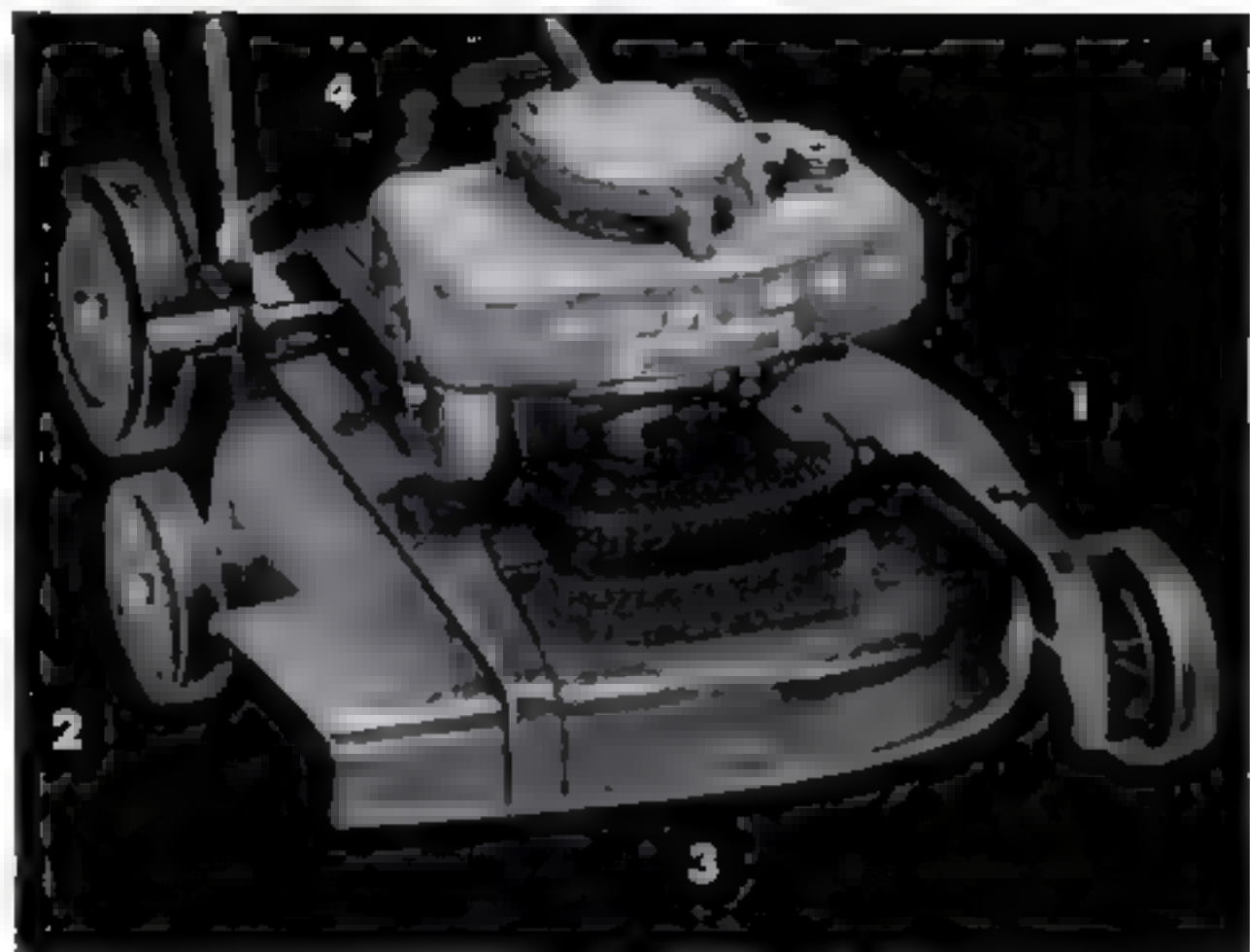
Jan. 26-Feb. 26

Drilling the relief well took a solid month. As the work went on, the wild well went wilder. It had cratered before. It cratered again, formed a new hole—and lake—only 250 feet from the new well. Gas poured upward through the second crater, but at first didn't catch fire.

Now the men feared the gas might force its way to the surface anywhere, anywhere at all. This happened. One man heard the now-familiar hiss of rushing gas right behind his heels. He looked, found a crack in the ground, with some gas pouring through it. It was only 50 feet from the newly erected water tanks.

The gas flow near the tanks simply stopped all by itself. But the gas from the new crater threatened to envelop the whole relief well. To keep it away, it had to be set afire, at its crater, by throwing a burning stick into it. Now there were two blazes over a wide area, which bulldozers worked like mad to wall off with earth. The two fires alternately died and

[Continued on page 248]



① Exclusive "Activated" Pilot Wheel keeps LAWN-BOY level... even on rough turf grass surface is cut level.

② Staggered Front Wheels let LAWN-BOY go right up and over high spots without leaving scalped patches.

③ Aluminum Die-cast Housing and specially close-machined blade with stabilizer lets LAWN-BOY trim to $\frac{3}{8}$ ".

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Every detail of LAWN-BOY is designed to give that LEVEL-CUT. To make absolutely sure each detail is right LAWN-BOY makes almost all their parts and assemblies.

"KNOW-WHY" DESIGN DEMANDED THE LAWN-BOY 2-CYCLE ENGINE



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Naturally efficient... LAWN-BOY operates at 3200 r.p.m. ... the truly efficient speed for rotary mowing. No adjustments needed! Ideal mowing speed is LAWN-BOY's natural speed.

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HALF AND HALF
—A CARGO OF CONTENT-
MENT IN THE BOWL
OF ANY PIPE



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60 Days and Nights in an Inferno

[Continued from page 246]

flared up again, till finally only the fire in the original crater remained, burning in all its fury.

Feb. 27

The new well was angled so successfully that its bottom hit within 12 feet of the old well's. Now tons of water had to go down it to smother the gas, and the fire, far beneath the surface of the earth. A parade of trucks began bringing water to the heated tanks beside the new well. From the tanks, five Halliburton pump trucks then took the water and pumped it down the well.

Problem: The water in the trucks kept trying to freeze. Their motion kept it from doing so but, when a truck stopped, it could turn into an iceberg in seconds. **Solution:** Perfect timing. The trucks were hooked onto the tanks almost before they stopped rolling, and their water taken out. When this couldn't be done, men opened a truck's cocks and let the water be wasted on the ground. Or they held blow torches to the truck's body to force out the water.

March 2-March 8

After 165,000 barrels had gone down the new well, nothing—nothing whatever—had happened to the fire. The boys had guessed wrong. The gas was not coming from the bottoms of the wells.

Problem: Where then was it coming from? Best hunch: A check, by means of a radioactivity device that measures hydrogen present in different layers of earth, indicated the most-likely place was 738 feet above the bottoms of the wells.

So the pipe inside the relief well was plugged at this point. And a perforating gun, lowered to the depth, fired steel bullets to open up the casing so the water would run out and flood, and (the boys hoped) this time cut off, the gas.

The water trucks again paraded to the well. On March 7, after 141,000 barrels had gone down, the gas flow became er-

[Continued on page 250]

If your headlamps look like these—

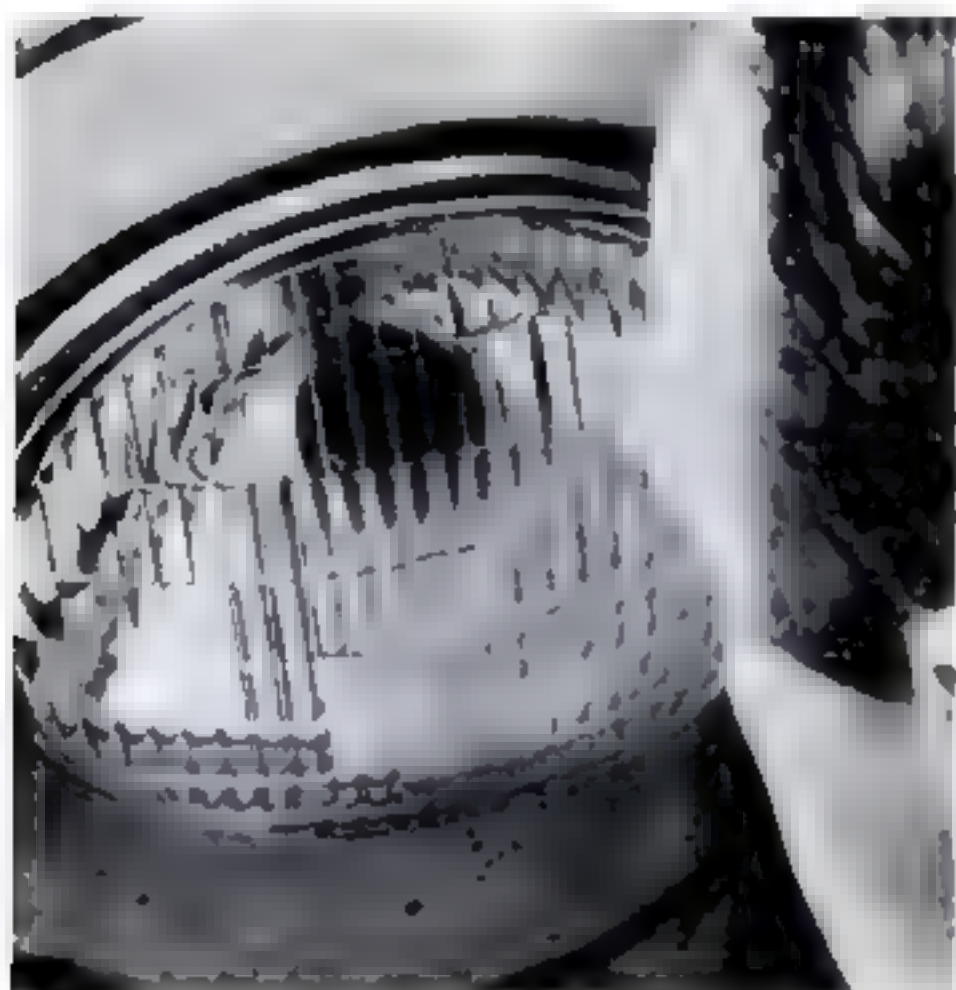
**YOU NEED A PAIR OF NEW G-E *All-Weather* HEADLAMPS
YOU'LL GET LOTS MORE LIGHT!**



WATER DROPLETS inside the lens not only scatter the light, but they also help discolor metal reflectors. This can't happen with G-E *All-Weather* Headlamps—moisture can't possibly get inside.



DISCOLORED REFLECTORS absorb light rather than reflect it, causing a loss of up to 50% of the original light output. Dirt and moisture can never enter G-E *All-Weather* Headlamps so the reflectors always stay shiny.



BLACKENED BULBS in old-style headlamps block out the light from the filament and cause a dangerous drop in light output. This can't happen with G-E *All-Weather* Headlamps because *there are no inner bulbs!*

**G-E *All-Weather* HEADLAMPS NOT ONLY GIVE
YOU LOTS MORE LIGHT... BUT YOU ALSO GET:**

Better seeing in fog, rain, snow—The lower beam filament has a special shield that cuts down reflected glare and lets you see better in any weather.

Lower beam puts twice the light 300 feet ahead at the curb—You can see much better against the glare of oncoming traffic.

Upper beam that reaches far and wide—For open road driving, the upper beam filament is left unshielded to let you see curves, dips—even side roads.

So, for safer night driving, get a pair of new G-E *All-Weather* Headlamps today — and have your dealer aim them when he puts them in. You'll see the difference tonight. General Electric Co., Miniature Lamp Dept., Nela Park, Cleveland 12, Ohio.



GENERAL  ELECTRIC



SKILSAW

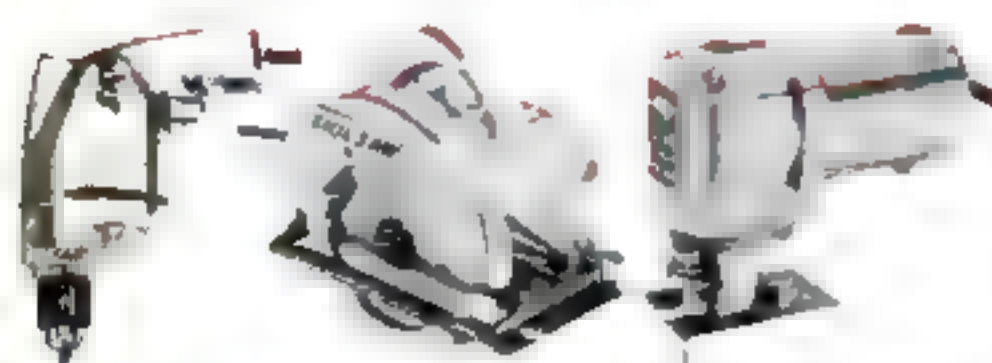
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60 Days and Nights in an Inferno

[Continued from page 248]

ratio. The next day, after another 44,938 barrels, the flow was obviously dying.

March 9-March 15

The fire slowly went out. But there was still a big problem, one rarely faced in oil fields, but often faced in Canada: To get out of there—fast.

There were signs of an early spring. Spring would thaw the muskeg and turn the whole place into a swamp. The solution was obvious: In days, almost everyone had scrambled. The job of pouring down cement to check the gas permanently was postponed for a year. Trucks loaded up with equipment, hitched on house trailers, and left. "No car could haul a trailer in that terrain," Clark says. Clark himself departed in his own car, with a day to spare, before the fluid muskeg made the region impassable.

Two men were left behind to stand by. (They could move around—a little—on sand hills and spots cleared of muskeg by bulldozers.) A pipeline from one river was laid so they could flood the well if gas broke out again. (The pipeline wouldn't freeze in summer.) As it turned out, all was quiet at the well, and they never had to turn on the water.

Sometimes, when oil men tell of the Akuinu fire, they compare it to what may have been the worst previous fire the North Country ever had. That was in 1934, when 20 blocks of Nome, Alaska, were razed. The Nome fire was out in a few days. Earl Clark and the others at Akuinu had two months of fire and ice. The total loss at Nome was \$1 million. The total bill for Akuinu is not in even yet. It will be greater.

But even if a wild well is nature on the loose, you don't give up on it. As soon last winter as the muskeg froze stiff again, the roughnecks swarmed back to the site of Akuinu River No. 13-36. They were drilling a new well. Even if oil didn't come, they counted on something else: to tap the natural gas for Canadian cities. They knew for sure that natural gas—lots of it—was there. **END**

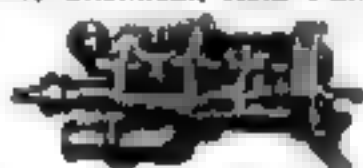
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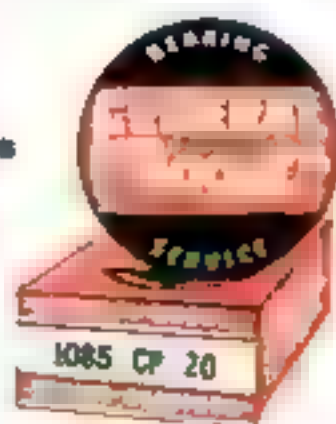
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Washing a House Saves Painting

[Continued from page 177]

off. Finally turn on the water and flush away the grime.

To minimize ladder climbing, you can add an extension handle to a hose brush. Use a long wooden floor-brush handle or a 1" aluminum tube. Allow this to overlap the handle of your brush about 15" or 18" and splice the two firmly together, using strips of waterproof plastic tape.

When working on wide overhangs or other hard-to-reach areas that require the use of an extension ladder, place the ladder to one side of the area to be washed. In this way you won't have to work directly overhead, and will not wind up getting a bath along with your house. You may sometimes find it advantageous to climb the ladder and squirt water downward.

For some spots you may have to resort to scrub brush and bucket. Use a strong commercial cleaner such as tri-sodium phosphate (commonly sold at paint stores under the name of Beetsol) dissolved in hot water. Scrub thoroughly with this solution while it is still hot. If you have much to do, better wear rubber gloves to protect your hands. Flush as soon as scrubbing is completed.

Stains below copper screens are the result of a chemical reaction with the paint. Scrubbing will lighten them considerably. You can minimize future staining by washing your screens before putting them up, and by coating the wire with spar varnish to prevent oxidation. Also scrub window sills to remove accumulated dirt, which frequently runs down and stains the siding.

Don't forget the trim. Trim paints, drying to a hard, enamel-like finish, are highly resistant to fading and do not chalk as readily as conventional house paints. The trim will benefit even more than the rest of the house from frequent washings. This is best done by hand, using either a sponge or a scrubbing brush. On these glossy surfaces, working in the sun may cause unsightly water spots. So keep in the shade. **END**

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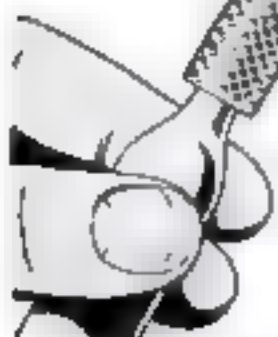
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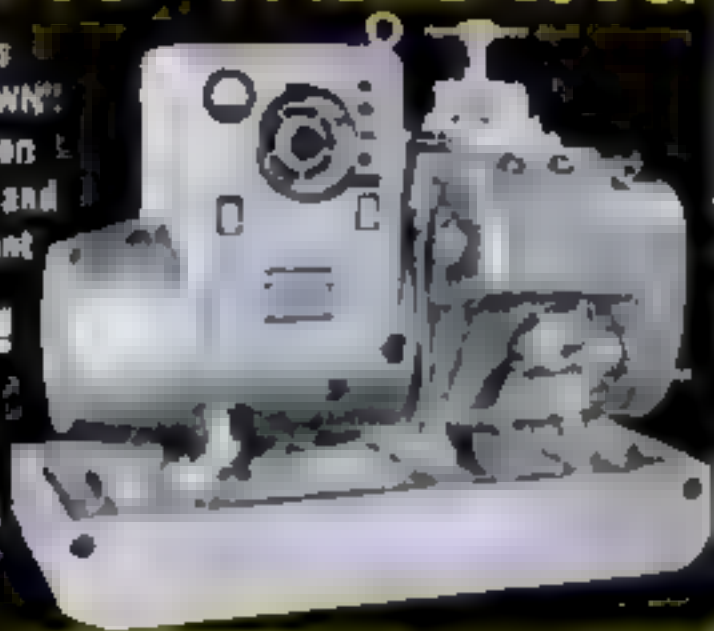
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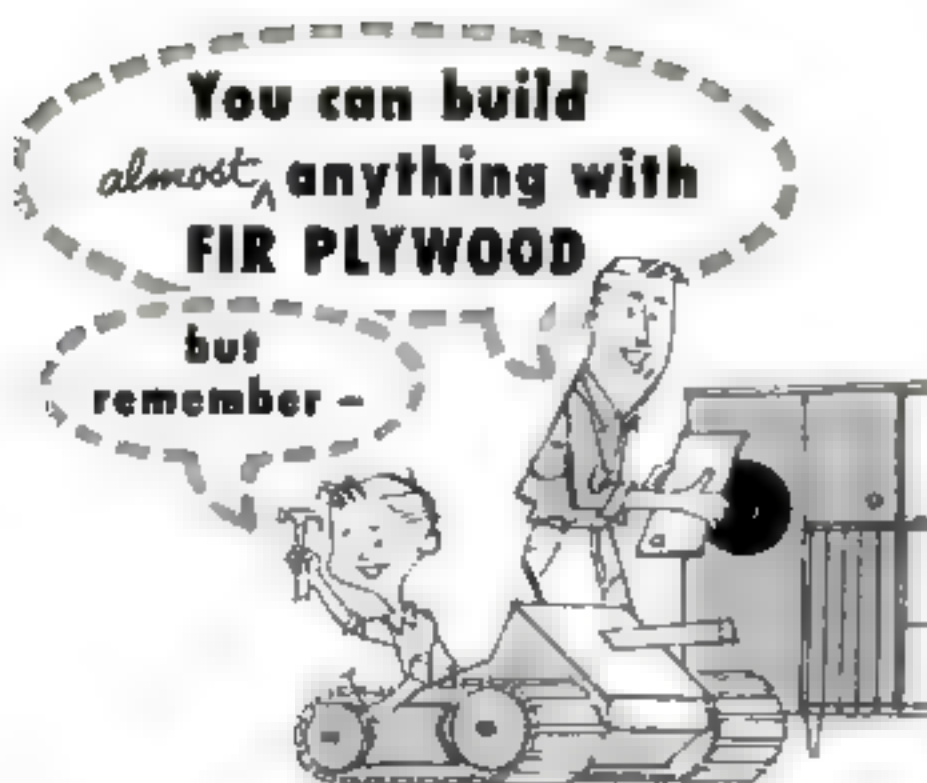
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FREE: Helpful booklets that show how to buy, use and finish plywood. Also, list of available homecraft plans. Write (USA only) Douglas Fir Plywood Assoc., Tacoma 3, Wash., Dept. 11.

Your House Is Your Savings Account

[Continued from page 10.]

ease of becoming a homeowner. For this, the federal government is largely responsible.

As a means of combating the great depression of the 1930s by stimulating residential construction, the government, through the Federal Housing Administration, began insuring mortgage loans at moderate interest rates. In 1945 it began guaranteeing veterans' mortgages, through the Veterans' Administration.

NOT only does the government still help homeowners and prospective homeowners to get loans on moderate interest terms, it also allows them to deduct the interest costs and even some home repairs on their income-tax returns.

Now, to the fact that more and more people can comfortably sing "Home, Sweet Home" with the authority of owning the home, add the fact that more and more of them are moving from home to home and are singing their affectionate tribute in new and different places.

The U.S. Census Bureau estimates that about one in every five American families, which is about nine million families, moves every year. These families move from region to region, with the general drift southwest and west; they move from country to city and from city to suburb. And in the process the large proportion of them who are homeowners cash in on their investments in their homes. (The government here provides another favor by excusing the payment of a tax on the profit in selling the old house if the family puts the money toward a more expensive home.)

To sum up: It has been made remarkably easy to own a home. Improvements and maintenance are more important than land value in determining the value of your investment. And the odds are lengthening that you will want to cash in on your investment.

END

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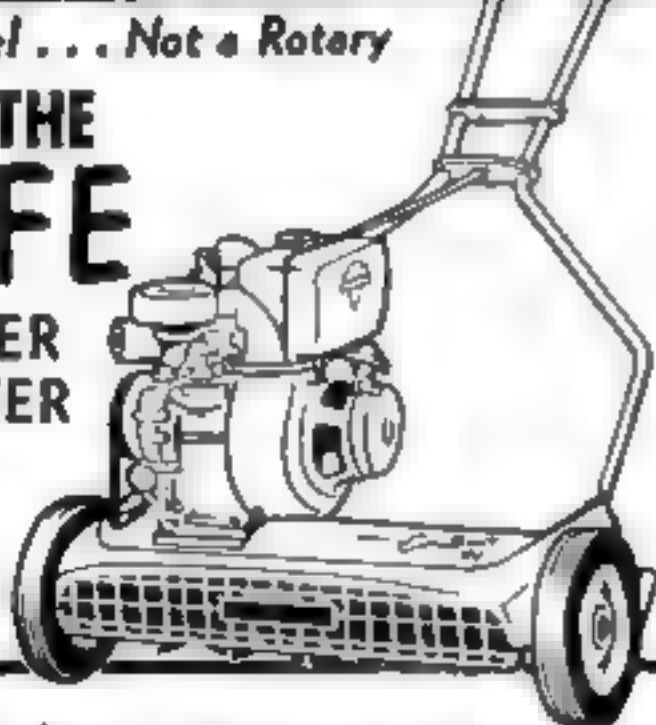
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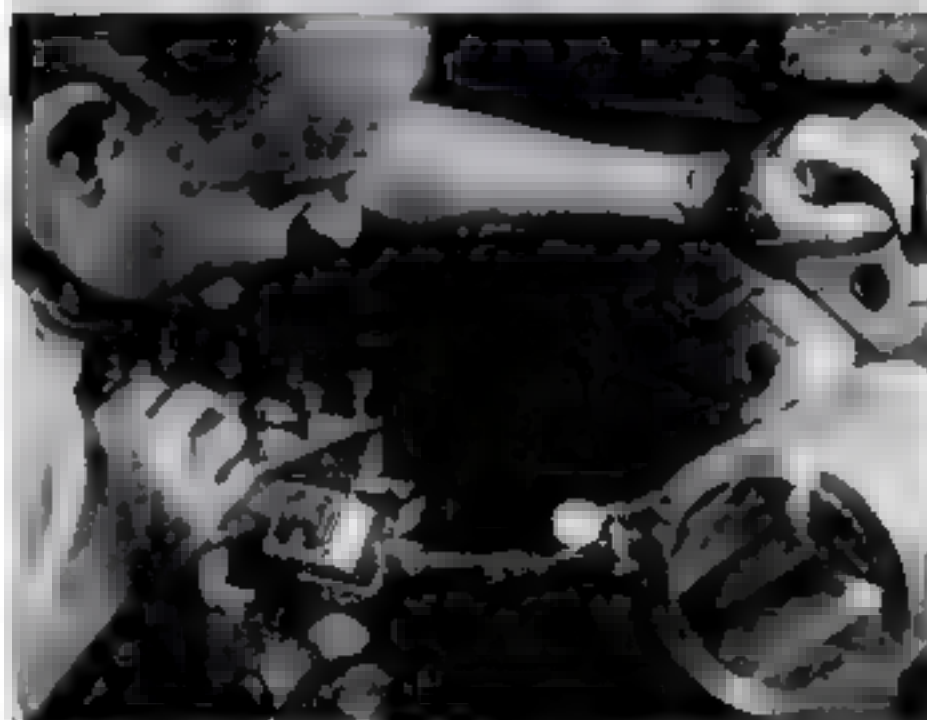


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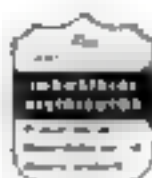
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Your choice of Block, Strip or Ranch Plank design

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Send complete information on prefinished Bruce Hardwood Floors.

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Bruce Hardwood Floors

Product world's largest hardwood flooring maker

Can Your Youngster Get Into College?

[Continued from page 96]

vice on the proper choice of studies for your youngster. If his high school lacks a guidance department, you can collect a lot of information yourself.

College catalogues, all of which give details on admission requirements, can be had for the asking.

Several large directories of colleges and universities, with a great deal of comparative information about them, are available in most public and high-school libraries.

The principal directories are: *College Blue Book* (C. E. Burckel & Assocs., Yonkers, N.Y.); *Directory of American Colleges and Universities* (American Council on Education, Washington, D.C.); *The College Handbook* (College Entrance Examination Board, Princeton, N.J.); and *Lovejoy's College Guide* (Simon & Schuster, New York, N.Y.).

2 Try to match your youngster's talents and interests with a college's specialties, including sports. One college may have a fine English department and an outstanding undergraduate orchestra. Another may specialize in physical sciences and have a strong debating team. Remember, that though grades count more than any other single factor in getting your youngster into college, extracurricular activities in high school are also considered carefully by admissions officers.

3 Have your youngster take College Board examinations, for practice, in his junior year in high school. The grades won't count unless he and you want them to, but they will give you both a good idea of how well he will do if he has to take them in his senior year.

Only one-tenth of the 1,852 U.S. colleges and universities require applicants to pass College Boards, but every college is glad to have a College Board score as a yardstick in judging an applicant. A high grade is a big help in getting into any college.

[Continued on page 258]

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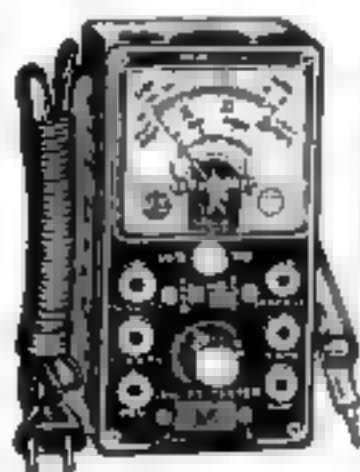


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FOR REPAIRING ALL ELECTRICAL APPLIANCES MOTORS • AUTOMOBILES • TV TUBES



AS AN ELECTRICAL TROUBLE SHOOTER THE MODEL 70:

• Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistance, Leakage, etc. • Will measure current consumption while the appliance under test is in operation • Incorporates a sensitive direct-reading resistance range which will measure all resistances commonly used in electrical appliances, motors, etc. • Leakage detecting circuit will indicate continuity from zero ohms to a megohm (5,000,000 ohms) • Will test Toasters, Irons, Broilers, Heating Pads, Clocks, Fans, Vacuum Cleaners, Refrigerators, Lamps, Fluorescents, Fans, Switches, Thermostats, etc. • Will test all TV tubes for open filaments, inter-element shorts, burned out tubes, etc. (Will not test TV tubes for quality. An emission type tester such as the Model TV-11 described below is required to test tubes for quality)

for quality. An emission type tester such as the Model TV-11 described below is required to test tubes for quality)

AS AN AUTOMOTIVE TESTER THE MODEL 70:

• Tests both 6 Volt and 12 Volt Storage Batteries • Generators • Starters • Distributors • Ignition Coils • Regulators • Relays • Circuit Breakers • Cigarette Lighters • Stop Lights • Condensers • Directional Signal Systems • All Lamps and Bulbs • Fuses • Heating Systems • Horns • Also will locate poor grounds, breaks in wiring, poor connections, etc.

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Name

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City

Zone State

All prices net. F.O.B., N.Y.C.

Can Your Youngster Get into College?

[Continued from page 256]

4 Help your youngster narrow the field of his choice of colleges as much as possible.

If he has made up his mind about a career, his choice of colleges will automatically be reduced, because all subjects are not taught in all colleges, or even in one college.

For instance, if he wants to study science or engineering, a lot of small colleges will be out of the question. Many of them do not have the equipment or the faculty to teach more than introductory courses in these fields.

One solution is to have your youngster apply to a liberal-arts college first, with the intention of transferring to a technical college later. Many liberal-arts colleges have formal cooperative arrangements with technical colleges, usually involving a five-year course of study.

Be realistic in surveying the college field. Your youngster will stand the best chance of getting into a college that usually takes students of about his level of ability. If you permit your son or daughter to shoot too high, you may cut down the chances of acceptance or, if accepted, the chances of getting through.

Here again, your youngster's high-school guidance department or his teachers can best advise you as to where he should apply. If you have questions that they can't answer, consult the admissions officers of nearby colleges or universities. Or talk with local alumni of the colleges you and your youngster have in mind, or with local members of whatever profession your boy or girl is thinking of entering.

Here are additional sources of information: the six regional college-accrediting agencies, whose addresses are given in most educational directories; the Council for the Advancement of Small Colleges, 726 Jackson Place, N.W., Washington, D.C.; and the American Association of Collegiate Registrars and Admissions Officers, addressed c/o Registrar, Miami University, Oxford, Ohio.

[Continued on page 260]

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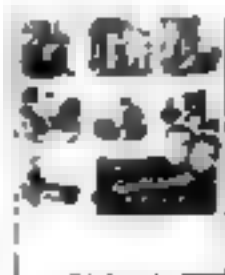
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Can Your Youngster Get into College?

[Continued from page 258]

Helping your daughter make a selection of colleges is harder. There are fewer colleges for girls than for boys. There are fewer dormitories for girls than for boys in co-educational colleges. There are fewer scholarships and fewer student-job opportunities. In addition, some colleges have slightly higher board-and-room charges for girls.

On the plus side, though, is the fact that several colleges for women only, particularly in the Midwest, are still hungry for applicants.

If your daughter wants to go to a co-ed college that has limited dormitory space, you can perhaps get around this by having her live with a relative nearby and enroll as a day student.

5 Take your youngster to visit the campuses in which he is particularly interested. It makes a favorable impression on a dean when a prospective student and his family come to the college to talk over applying for admission.

If you live too far away to make a campus visit practical, arrange for your child to talk with a local alumnus of the favored school or with a traveling representative of the college.

6 Have your youngster apply to three or four different colleges in the area of his choice. But don't let him use mimeographed forms in applying, as some youngsters do. Each college wants to admit only those youngsters who really have their hearts set on that particular school. Though the college authorities realize that there is a good chance that each applicant has tried a few other places, they don't relish the impression that he has tried so many colleges that he couldn't take the trouble to fill out individual forms.

7 Consider these ways of beating the competition. If your youngster is not at or near the top of his high-school class, his chance of getting into college

[Continued on page 262]

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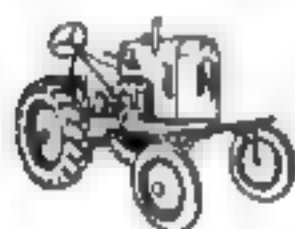
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"TRU-CIRCLE" saw set automatically sets teeth at 10° or more. **\$2.95** PPD.

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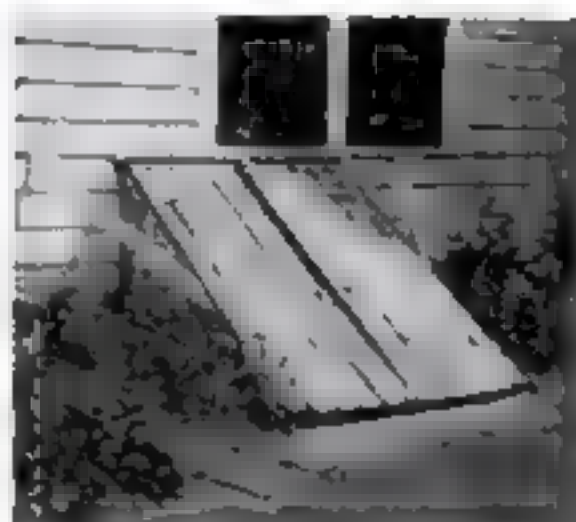
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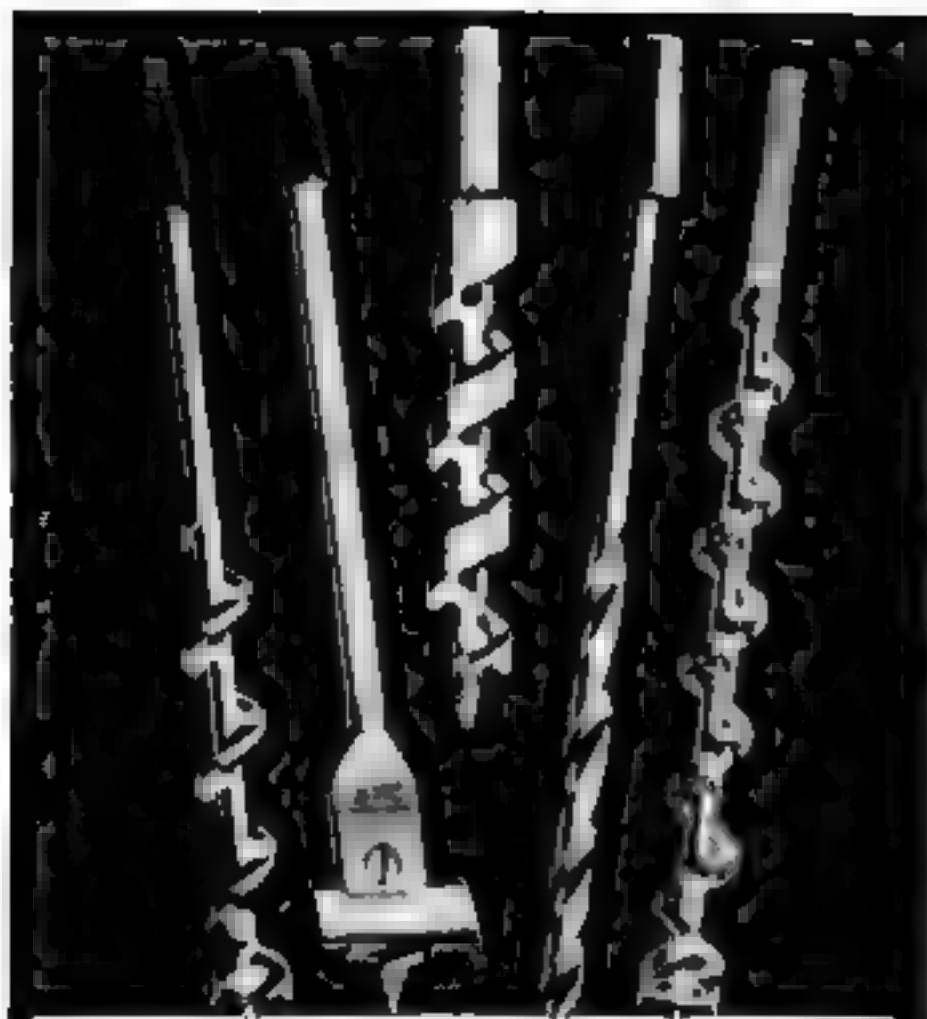
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Can Your Youngster Get into College?

[Continued from page 260]

will be much improved if he applies to:

- A Midwestern college or university, rather than one on either coast. Midwestern institutions, as a whole, are least full. Those in the East are most crowded, and those in the Far West are not far behind.

- A college far away from home, rather than nearby. Most private colleges try to maintain a geographic cross-section among their undergraduates, and they receive the fewest applications from the greatest distances.

- A little-known college, rather than a prominent one.

- A new college, rather than a well-established one. Some institutions are starting new branches and some states are going to build entirely new universities. These are eager to get students at the beginning.

New York State, for instance, is planning a new senior college on Long Island. The University of Illinois is planning a new four-year branch in the Chicago area. MacMurray (in Jacksonville, Ill.), a high-ranking girls' college, is starting a coordinate college for men, using its present experienced faculty.

- A two-year college, rather than a four-year college. Drop-outs and flunk-outs at four-year colleges leave room for transfers who could not be accommodated as freshmen. Several states already have, or are building, networks of community junior colleges.

Above all, don't give up trying because the competition is fierce. On the other hand, you can't afford to be complacent. It will take earnest teamwork between you and your youngster to enable him to get into college, and it must be begun early. But this cooperation in a quest so desirable to you both is bound to create a warmer, more satisfying relationship between you and your youngster.

END

ANSWERS to exam questions on page 96:

1. (B) 2. (D) 3. (E) 4. (D) 5. (B) 6. (D)
7. (B) 8. (D) 9. (D) 10. (A) 11. (D) 12. (E)
13. (C) 14. (A) 15. (B) 16. (C).

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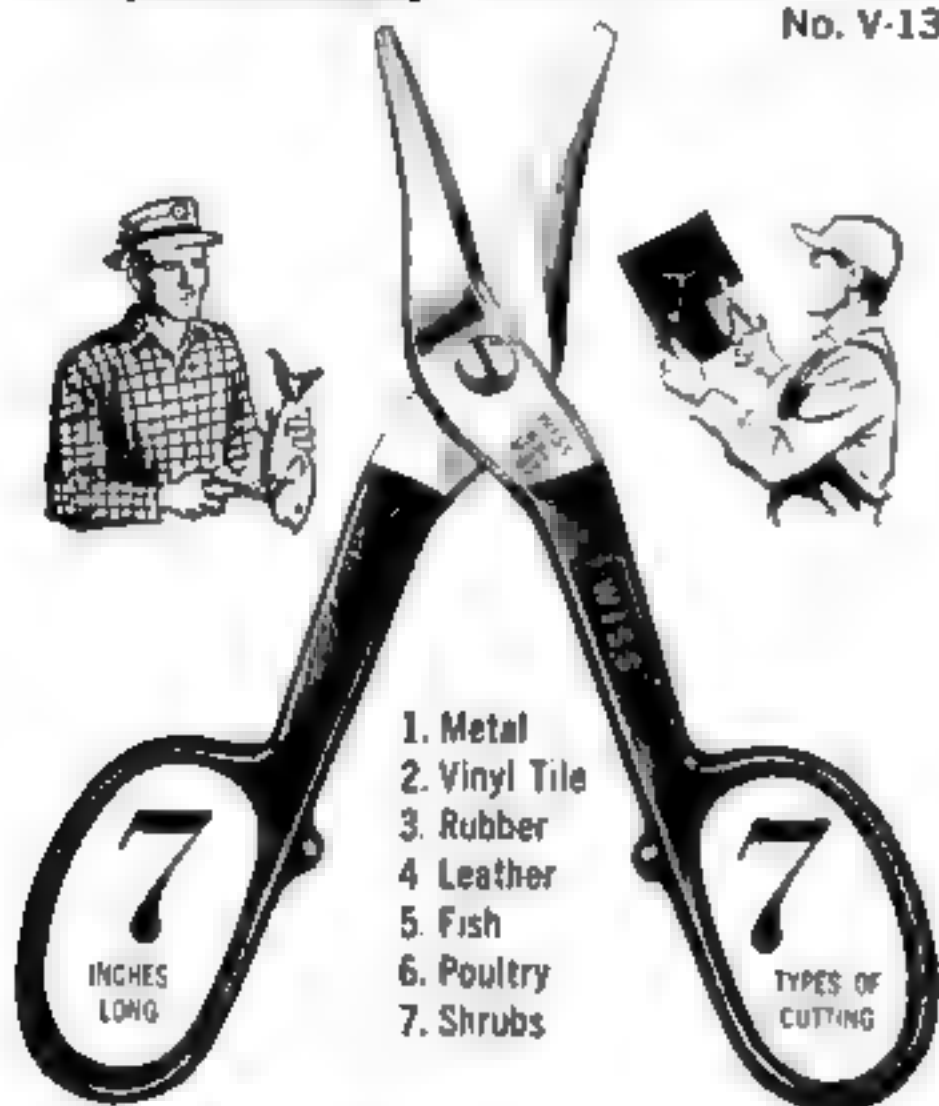
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Vinyl handle grips optional and extra.

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WISS always a cut above competition

Facts on the '57 Power Mowers

[Continued from page 103]

The typical rotary cutter looks simple but isn't. It is a steel bar, the two leading edges sharpened for the last few inches of their length. These edges slice off the grass on the front half of the swing.

Lift. Back edges of the blade are curved, fan-like, to blow air upward. The suction lifts the grass up straight so that it is all sliced off evenly. The amount of "lift" designed into the blade is important: too little and you get a ragged cut, too much and you blow dust all over the yard. Strangely, the lift curve wears down (from hitting dust and sand in the grass) about as quickly as the cutting edge does. That's why a freshly resharpened blade may not cut as smoothly as you think it should. (Replacement instead of resharpening is the answer; the blades are cheap.)

The rotary cutter is fastened directly to the engine shaft. If the cutter hits a stone, the shock is transmitted to the shaft. Usually there's some provision for slippage—perhaps a fiber washer between the cutter and its fastener. Just how much protection this "slip clutch" provides is debated in the industry.

Some cutters are made in sections: A short bar is fastened rigidly to the engine shaft, and blades are attached lightly to the ends of the bar. Theoretically, at least, an obstruction would make the blades pivot back and little shock would get to the engine shaft. Jacobsen extends this idea by using small, pivoting blades at the edge of a bowl-shaped "rotor." The rotor provides lift suction as well as protection to the engine shaft.

Clippings. A reel mower throws big fat clippings up and back, where you can collect them in a grass catcher, rake them up later, or just leave them.

Rotaries? Well, the advertisements say that the blade grinds up clippings into a fine mulch which sprays out to disappear into (and enrich) your lawn. It does, too—so long as the grass is good and dry. It may not do that so well,

[Continued on page 266]

your best buy in a paint sprayer



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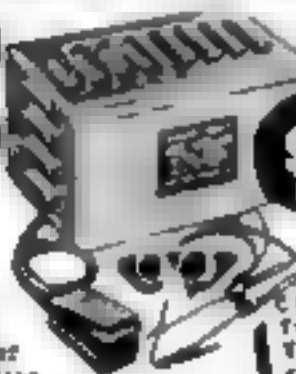
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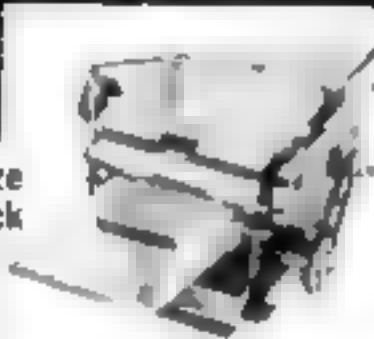
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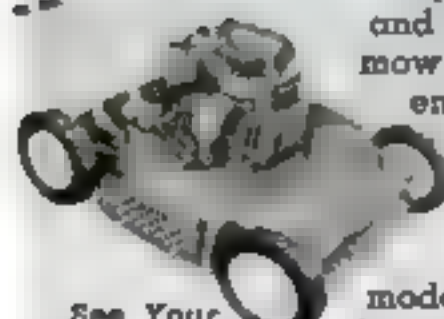


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Facts on the '57 Power Mowers

[Continued from page 264]

though, if the grass is wet. Sometimes wet clippings clump together, then blurb out to give your yard the messy look of a sheep pasture. Or they may stick to the inside of the housing, clog the discharge opening and build up until the engine stalls trying to push the blade through the packed mass.

Every mower man we talked to admitted that This Is a Problem. Some blades have right-angle projections at their tips; these are supposed to scrape clumped clippings free.

The design of the housing seems to influence clumping most, but no sure-fire shape has been found. One expert thinks that the space above the cutter bar is critical. It should be large enough, he says, to keep the clippings suspended in air as a spray that can leave the housing easily, but small enough to make the air stream move at high velocity.

Body. The housing enclosing a rotary cutter has to support a heavy, vibrating engine and also shield you against flying fragments of stones, sticks—or broken blades. So, strength is an important consideration. Stamped steel—if it's thick enough—is sturdier than cast aluminum. But the better rotaries usually have aluminum decks because the customers prefer their lighter weight (they can also be made to look prettier). These are probably as strong as the 14-gauge steel that is commonly used.

The weight of the mower is one factor in ease of pushing, but the size of the wheels and the quality of their bearings are more important. The bigger the wheels are (rear ones particularly), the better—Yazoo uses 16-inch bicycle wheels. Many mowers have staggered wheels, which help them cross uneven ground without tilting.

Power drive. A rotary mower needs no transmission, unless you want the engine to drive the wheels. Then things get complicated and expensive.

The trouble is this: The engine output has to be slowed way down, and then

[Continued on page 268]

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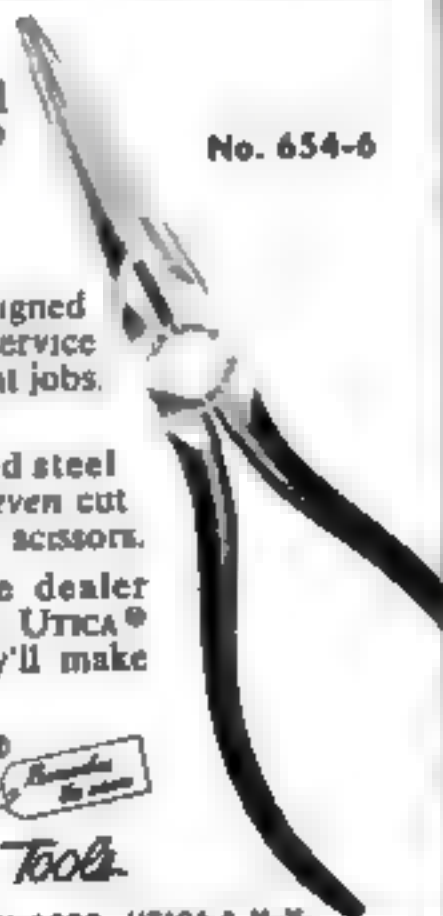
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Facts on the '57 Power Mowers

[Continued from page 266]

led around a corner, from the vertical shaft of the engine to the horizontal shafts of the wheels. To accomplish this, manufacturers use everything from twisting belts and rotating disks to automotive differentials. Some drive the rear wheels (better traction); others drive the front ones (easier to turn or pull backward—you tip the drive wheels off the ground). Few small rotaries have powered wheels, and none of these are listed in the PS chart.

It's another story with reel mowers. There is no corner for the power to turn and you need a transmission to spin the cutter anyway. The wheels can be geared directly to the cutter, as in a hand mower, or driven by a second power train.

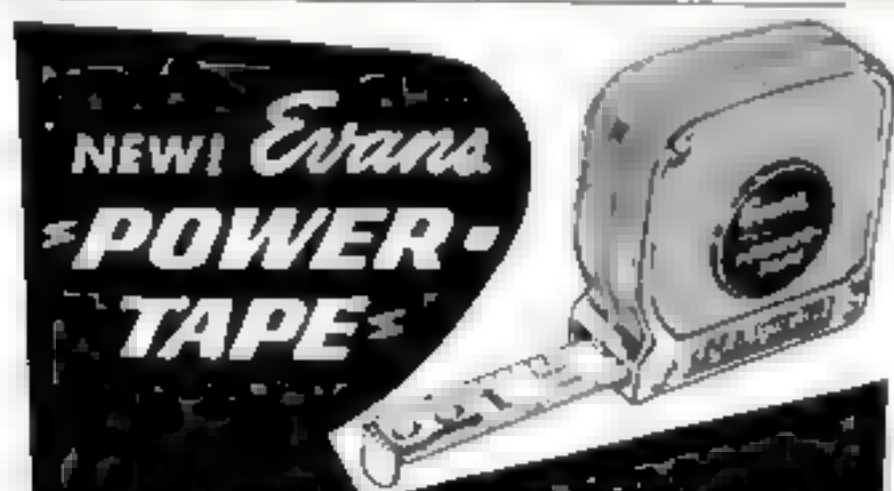
Chain or gear drives are more positive than belts, which may slip if grass gets into the pulleys. Some slippage in the cutter drive, however, is advantageous, since it protects the blades from serious damage when they jam on a stick or stone. For this reason, gear or chain arrangements may include slip washers. Guards that completely enclose chains or belts are very desirable safety features.

Clutches. The friction or automotive type of clutch will probably require less fussing than the simple movable pulley that tightens a drive belt.

Location of the clutch in the drive train also makes a difference on a reel mower. If it can disengage the wheels while the cutter revolves, you can mow around shrubs more easily. Two independent clutches are even better; then you can disengage the cutter and let the wheels drive the mower into the garage.

Service. Unless you are on intimate terms with carburetors and magnetos, you will need service for your mower as much as for your car. Find out, *before* you have trouble, where you can get it repaired. It's a good idea to quiz friends and neighbors about the quality of work turned out by the shop you have in mind. If the shop is distant or its service sloppy, better look some more.

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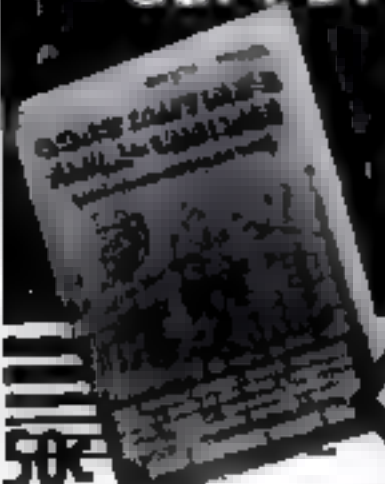
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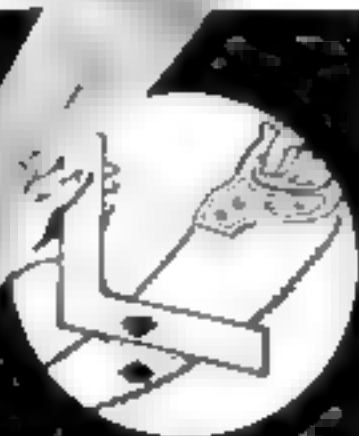
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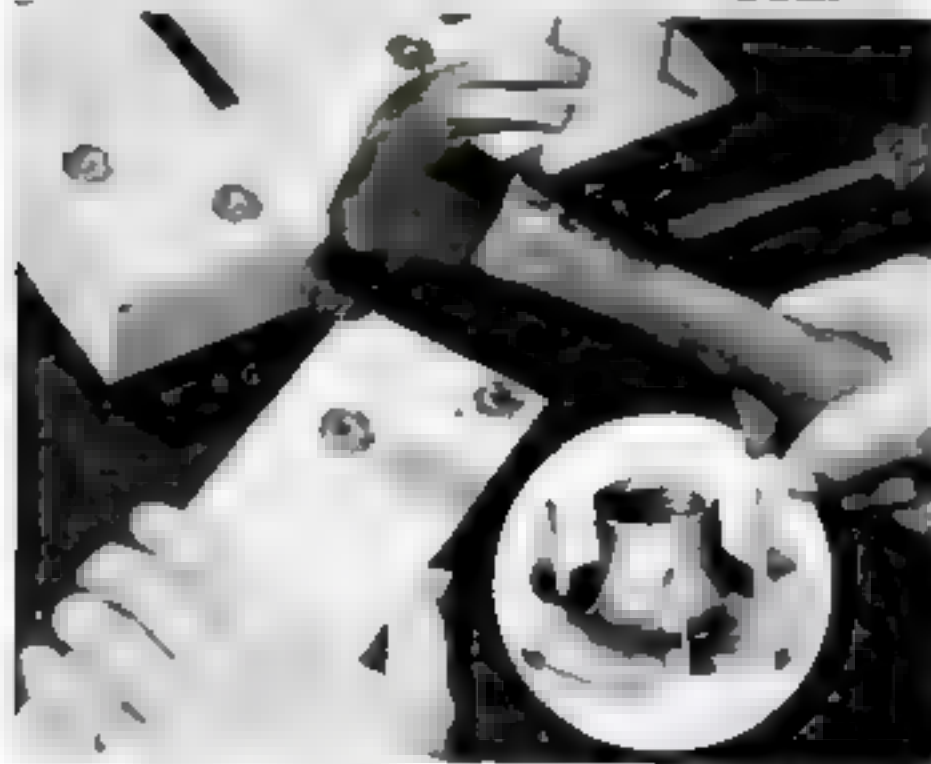
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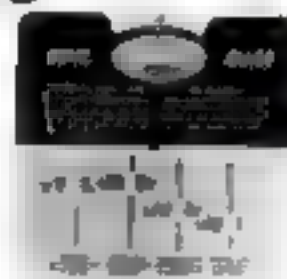
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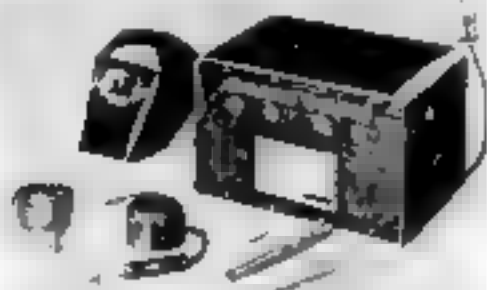
DYNAMIC WELDER COMPANY, 1808 S. Federal Street, Dept. D3-D, Chicago 16, Illinois

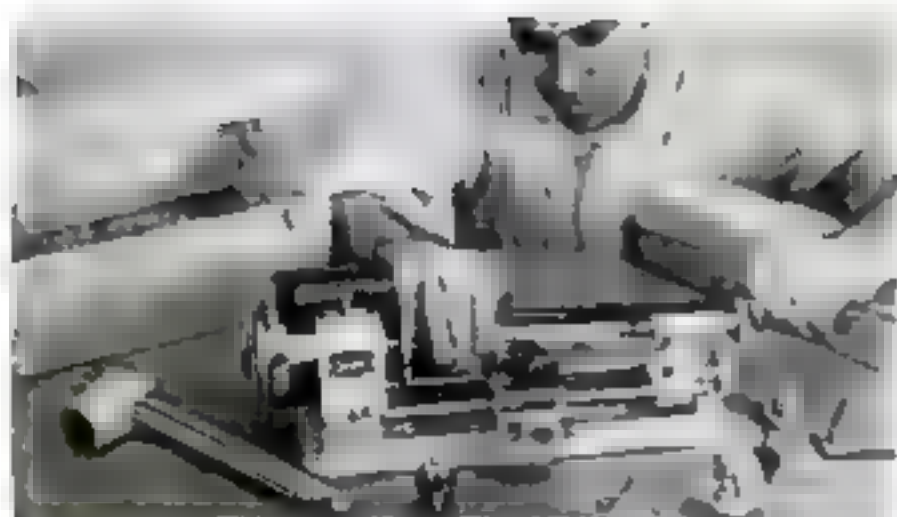
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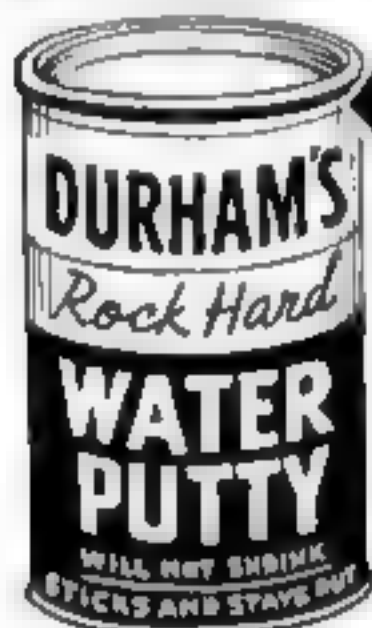


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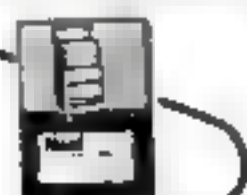
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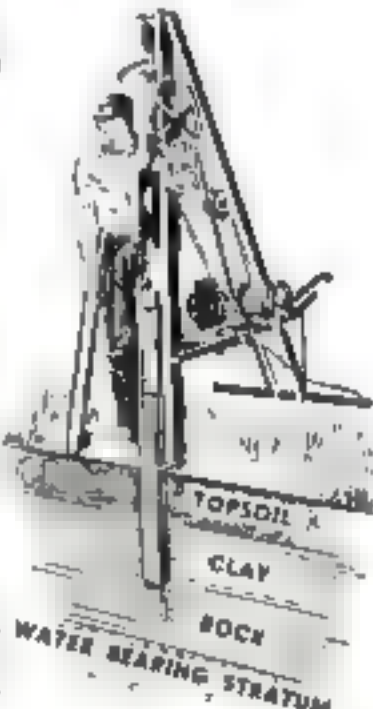
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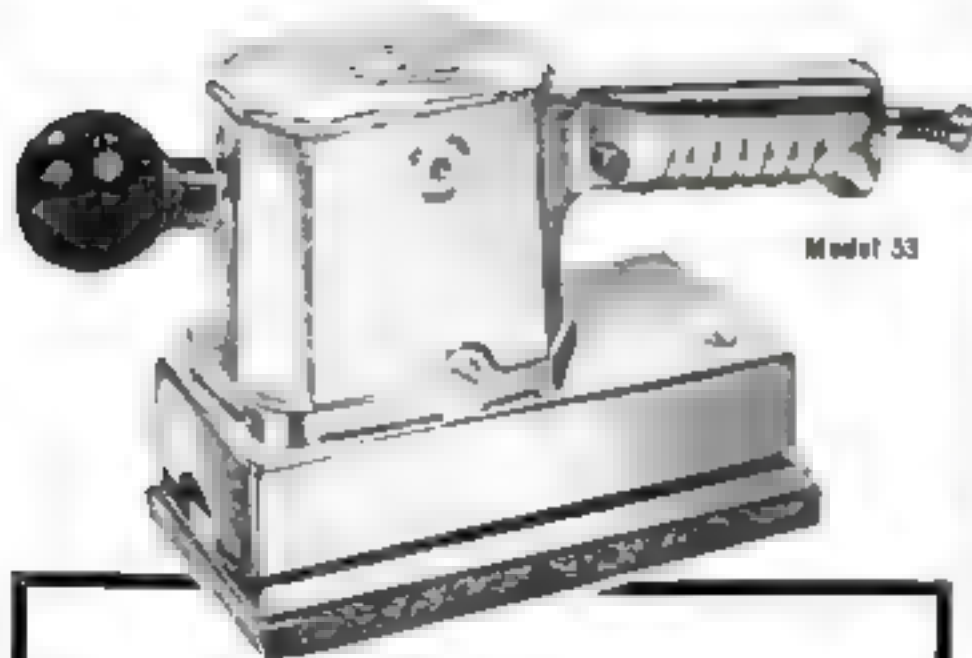
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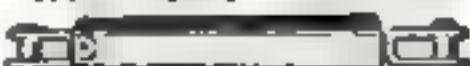
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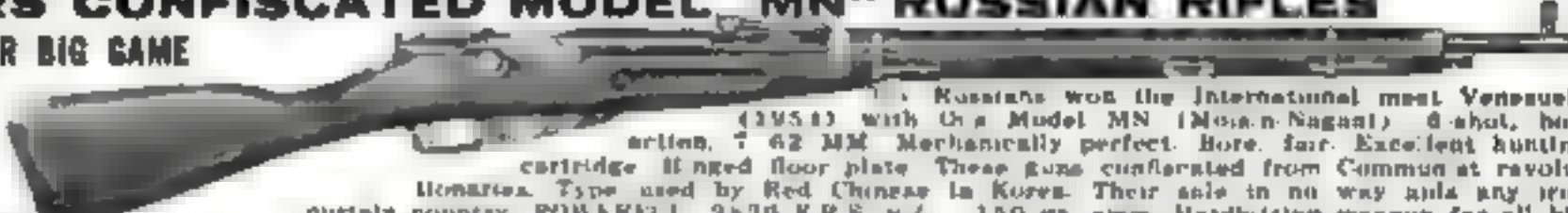
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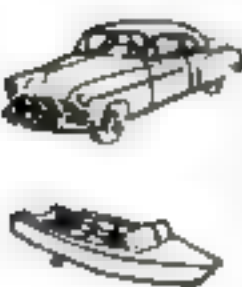


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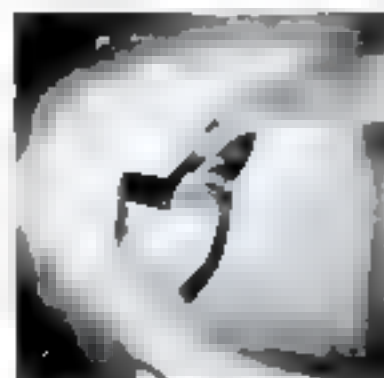


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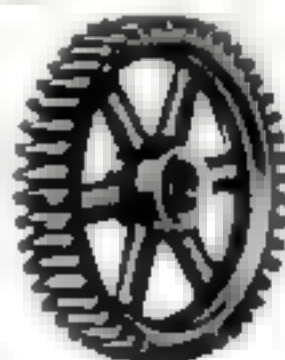
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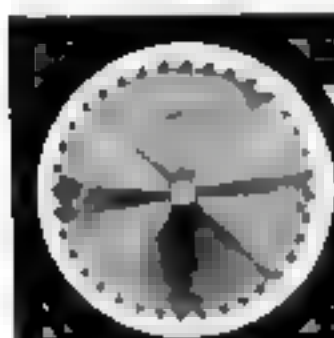
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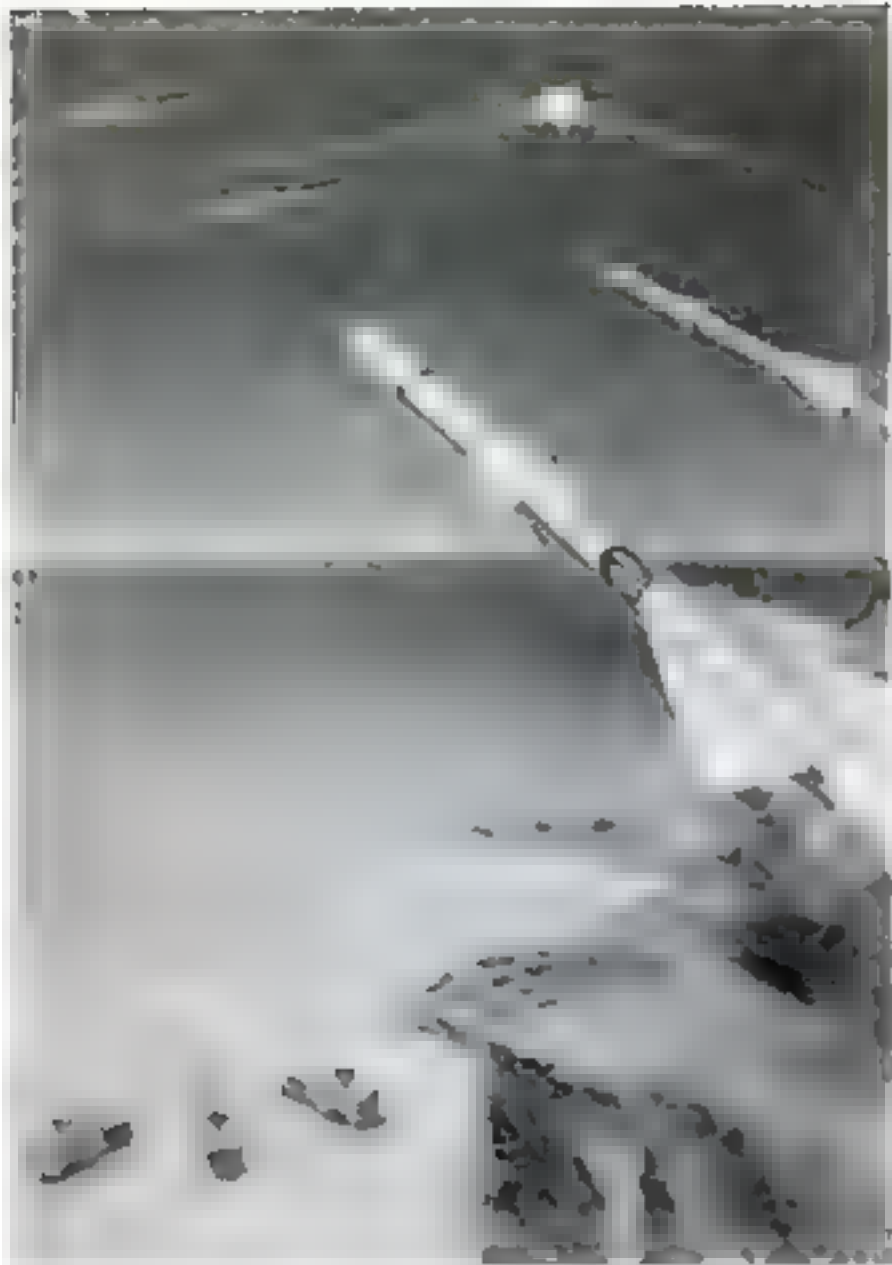
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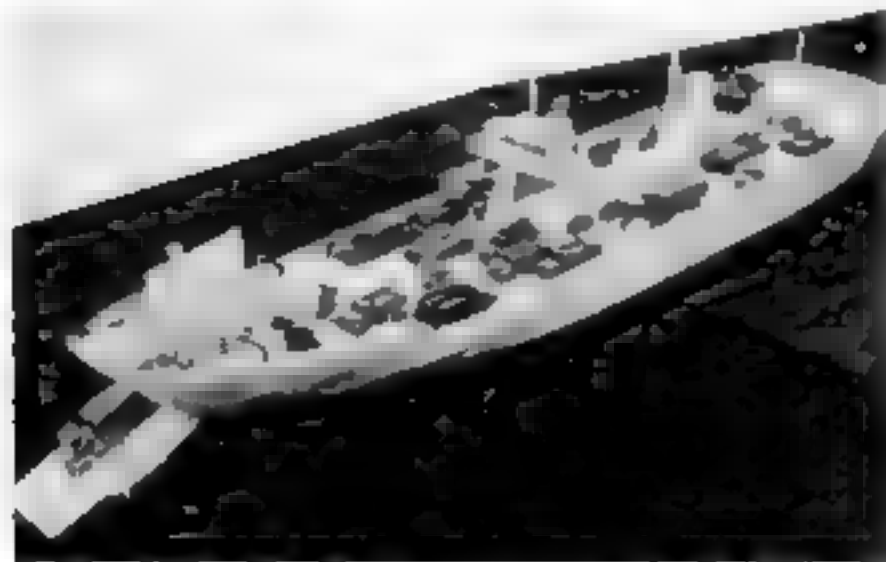
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A NEW radar beacon only six inches long (cutaway in drawing) rides rockets and guided missiles to help ground crews track them at greater range and with less interference than with radar echoes. Its receiver-transmitter, power supply and antenna add up to a four-pound package.



Barge Speeds Cargo to Beach

HERE'S the kind of lighter that will catch cargo from the new roll-on-roll-off military transports and run it, at 12 knots, directly to a beach. The model shows the barge with unloading ramp dropped. Carrying load will be 600 tons of vehicles or 1,000 tons of general cargo.

What's Coming in 1958 Cars

(Continued from page 38)

In the works, but still far from the production line:

- A paint that would give all cars coming off the assembly line the same shade, a pastel. Dealers would give the buyer whatever color, or combination of colors, he wanted by "shooting" the paint with an electron gun. A car owner could change colors any time he chose just by revisiting the dealer.

- "Austerity" cars, European style. GM, Ford Motor and Chrysler all have such cars on the drawing boards. But don't look for them unless the bottom falls out of sales on regular models. All three corporations keep looking at the booming sales of the Volkswagen in this country, at the moment more in surprise than apprehension. If an austerity car were produced here, it would retail for at least \$400 more than a VW because of our higher production costs.

Sensitive to styling changes? 1957 is a safe year to buy a new car. Among the brands that won't change much for the 1958 model year are Buick, Olds, Cadillac, the regular lines of Merces, Ford, and the entire Chrysler Corp. stable—Plymouth, Dodge, DeSoto, Chrysler and Imperial. Hundreds of millions of dollars were sunk into them for 1957's changes, and the companies have to write off their investments.

One of these cars may undergo a bit more than a face lift. A picture of its rear end hangs in a Chrysler Corp. office, with this legend scribbled underneath: "Suddenly it's 1950." It *does* look a little dowdy. Needless to say, the car competes with Chrysler's.

Ever wonder how far ahead your car was planned? Well, here's the way it is:

The mechanical characteristics of the 1958 cars were determined late in 1955, the styling early in 1956. Tooling for production, which takes 16 to 18 months, was started early in 1956. Hand-built 1958 test cars were running last year. Late this year or early in 1958, Detroit will have a pretty good idea of how its 1960 cars will act and look. END



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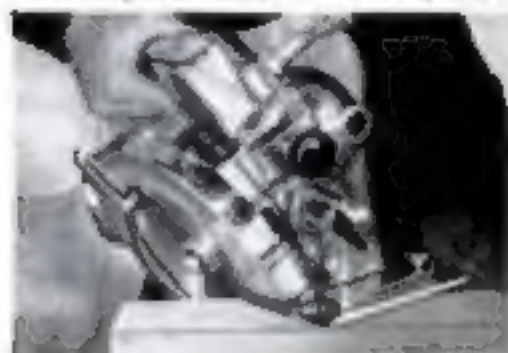
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bevel adjustments, and other profes-
sional features. List Price \$117.50—
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Rugged 8 1/4" saw for the builder
who needs extra speed and power on
all cutting jobs. Features Kickproof
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tric saw trade-in . . . \$84.50.



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Heavy duty 7 1/4" saw with blade on
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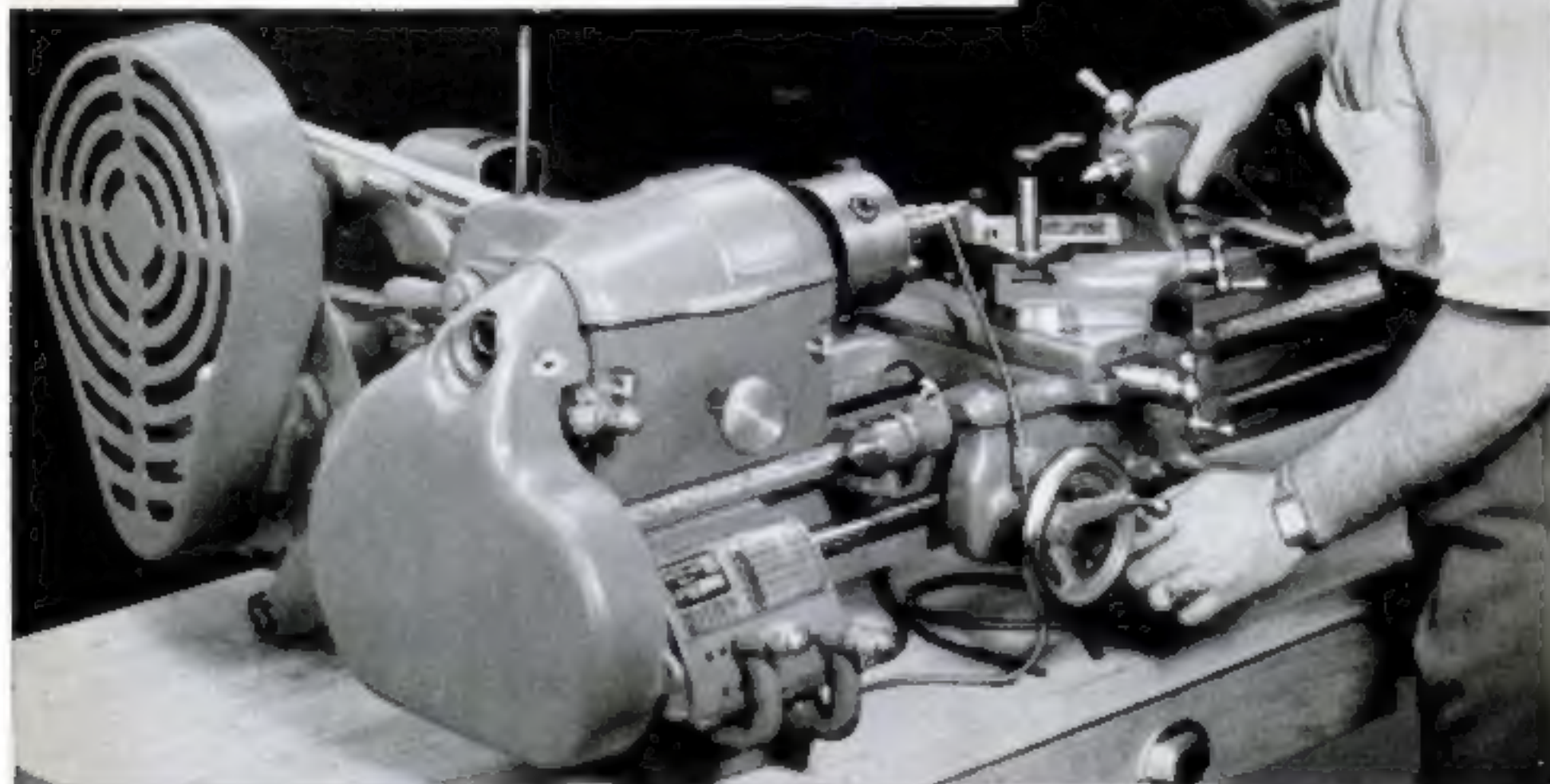
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